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SELECTED WATER RESOURCES ABSTRACTS

VOLUME 10, NUMBER 5
MARCH 1, 1977

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SELECTED WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center, Office of Water Research and Technology, U.S. Department of the Interior

VOLUME 10, NUMBER 5
MARCH 1, 1977

W77-02076 -- W77-02575

ecretary of the U.S. Department of the Interior has de-
ed that the publication of this periodical is necessary in the
ction of the public business required by law of this Depart-
ment. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

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FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into 10 fields and 60 groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on the inside back cover

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the Bio-Science Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
Washington, DC 20240

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ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

1. NATURE OF WATER

1A. Properties

CONFIGURATION INTERACTION STUDIES OF THE EXCITED STATES OF WATER,
Aerospace Corp., El Segundo, Calif.
N. W. Winter, W. A. Goddard, III, and F. W. Bobrowicz.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A010 599, Price codes: A03 in paper copy, A01 in microfiche. Report No. SAMSO-TR-75-129, April 15, 1975. 29 p, 4 tab, 40 ref. F04701-74-C-0075.

Descriptors: *Water chemistry, *Water properties, *Molecular structure, *Mathematical studies, *Water structure, Equations, Laboratory tests.
Identifiers: *Excited states, *Water molecule, *Configuration interactions, *Electron impact excitation, *Transition energies, Electron orbitals, Excitation energies, Rydberg constant, Electron impact spectra.

The results of extensive configuration interaction studies of 16 excited states of water were reported. These states can be accurately described as corresponding to excitation from one of the highest two molecular orbitals (1b sub 1 or 3a sub 1) of the ground state into either the 3s or one of the three 3p Rydberg orbitals. The results provide the most accurate and consistent treatment of these states to date (within 0.1 eV for all known transitions) and form a reliable basis for the assignment of the photon and electron impact spectra of H2O. (Henley-ISWS)
W77-02153

2. WATER CYCLE

2A. General

UTILITY OF URBAN RUNOFF MODELING, (PROCEEDINGS OF A SPECIAL SESSION, SPRING ANNUAL MEETING, AMERICAN GEOPHYSICAL UNION, WASHINGTON, D.C. 14 APRIL 1976.
American Society of Civil Engineers, New York.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 460, Price codes: A07 in paper copy, A01 in microfiche. ASCE, Urban Water Resources Research Program Technical, Memorandum No. 31, July, 1976, 126 p., 8 tab., 32 fig., 99 ref. OWRT C-5045(No. 4224)(7).

Descriptors: *Urbanization, *Urban runoff, *Computer models, *Local governments, *Water pollution sources, *Project planning, *Automatic control, *Design, Data collections, Storm drains, Water quality control, Land use, United States, Rainfall-runoff relationships, Forecasting, Detention reservoirs, Canada, Australia, Combined sewers, Simulation analysis, Cities, *Urban drainage, Mathematical models, Model studies.
Identifiers: *Urban rainfall-runoff-quality relationships, Storm sewer discharges, Combined sewer overflows, Urban runoff gaging, Federal Republic of Germany.

The proceedings of a Special Session, Spring Annual Meeting, American Geophysical Union, Washington, D.C., 14 April 1976 include three invited papers by a Panel on Local Government Model Use and Need, seven related invited papers, two written discussions, and the full text of all Session floor discussion. A third of the about 60 participants contributed to the floor discussion, which occupied two-fifths of the total Session duration. The thrust of the Session was an attempt to define reasons why mathematical models of urban runoff should be used more extensively and more effectively in local government projects; that is, why the use of more sophisticated models would be more cost-effective than simpler, traditional procedures. Rationales were identified for planning, design and automatic control applications. The Session provided an outstanding opportunity for communication between users of the findings of research products and science-oriented researchers.
W77-02076

A MODEL FOR PREDICTING FLOOD HAZARDS DUE TO SPECIFIC LAND-USE PRACTICES,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Civil Engineering.
B. B. Ross, D. N. Contractor, E. A. Li, V. O. Shanholtz, and J. C. Corr.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 389, Price codes: A06 in paper copy, A01 in microfiche. Virginia Water Resources Research Center, Blacksburg, Bulletin 99, September 1976, 118 p, 36 fig, 18 tab, 99 ref. OWRT A-062-VA(2).

Descriptors: *Overland flow, *Channel flow, *Computer models, Infiltration, Land use, *Finite element analysis, Model studies, *Virginia, *Precipitation excess, Hurricanes, Simulation analysis, *Flood forecasting, Watershed management, Rainfall-runoff relationships.
Identifiers: *Hydrologic response units, *Hurricane Camille, Flood hazards, *South River watershed(VA).

This investigation developed a finite element model for mathematically routing overland and channel flow when rainfall excess is known. To determine rainfall excess, a procedure was developed to subdivide a drainage area into similarly responding units, defined as hydrologic response units. These units were functions of soil texture, soil depth, land use, and hydrology group classification. A computer model, based on the Mein and Larson and Holtan infiltration equations, was developed to generate excess precipitation for each hydrologic response unit. A finite element grid, devised for both the watershed and the main streams, allowed use of the hydrologic response units within an element to obtain weighted rainfall excess values for each element. A one-dimensional finite element scheme, in conjunction with Galerkin's residual method, simulated overland and open channel flow. Hurricane Camille (August 1969) provided an event by which the model was tested and calibrated on the South River watershed in Augusta County, Virginia. Having the ability to report changes in land use, the finite element procedure allowed several arbitrary land-use changes to be incorporated into the model in order to observe the river's response under flood conditions. The effects of changes in the number and size of the elements in the watershed and in the streams also were observed, along with changes in the size of the time increment.
W77-02078

AN ANALYSIS OF THE EFFECTS OF PARAMETER UNCERTAINTY IN DETERMINISTIC HYDROLOGIC MODELS,
International Inst. for Applied Systems Analysis, Laxenburg (Austria).
E. F. Wood.
Water Resources Research, Vol. 12, No. 5, p 925-932, October 1976. 12 fig, 1 tab, 6 ref.

Descriptors: *Parametric hydrology, *Model studies, Analytical techniques, *Flood frequency, *Simulation analysis, *Rainfall-runoff relationships, Stochastic processes, Water resources, Water loss, Systems analysis, Equations, Risks.
Identifiers: *Deterministic models.

The uncertainty in the output of deterministic models, due to the uncertainty in the parameters of the model, is analyzed and compared to current procedures of using average values for the uncertain parameters. The present analysis considers an analytical rainfall-runoff flood frequency model where the infiltration parameter is considered as a stochastic variable. The same conceptual procedure can be used to analyze fixed but uncertain (unknown) parameters. The extension to analyzing parameter uncertainty in large simulation models is indicated, and the importance of such analyses is discussed. (Bell-Cornell)
W77-02125

SIMULATION OF ROOT-ZONE WATER AND DEEP SEEPAGE TO A WATER TABLE,
Connell/Metcalf and Eddy, Coral Gables, Fla.
For primary bibliographic entry see Field 2G.
W77-02295

SELECTION OF STREAMFLOW AND RESERVOIR-RELEASE MODELS FOR RIVER-QUALTIY ASSESSMENT,
Geological Survey, Jackson, Miss.; and Geological Survey, Lakewood, Colo. Water Resources Div.
M. E. Jennings, J. O. Shearman, and D. P. Bauer.
Available from Branch of Distribution, USGS, 1200 S. Eads St., Arlington, VA, 22202. Circular 715-E, 1976. 11 p, 4 fig, 1 tab, 35 ref.

Descriptors: *Mathematical models, *Streamflow, *Reservoir releases, Model studies, Methodology, Reviews, Project planning, Water quality control, Hydrology, Evaporation.
Identifiers: Flow routing.

Sound water-resource planning requires consideration of realistic alternatives. Digital models, based on hydraulic and hydrologic principles and utilizing adequate input data, can be used to simulate the response(s) of a water-resource system to various alternatives. Streamflow and reservoir modeling methods are reviewed, including a discussion of general data requirements. Guidelines for model selection are presented with both hypothetical and actual studies used to illustrate possible selection procedures. (Woodard-USGS)
W77-02302

COMPARISON OF LINEAR SYSTEMS AND FINITE DIFFERENCE FLOW-ROUTING TECHNIQUES,
Geological Survey, Jackson, Miss. Water Resources Div.
For primary bibliographic entry see Field 2E.
W77-02319

MATHEMATICAL MODELS IN HYDRAULICS AND COASTAL ENGINEERING,
International Courses in Hydraulic and Sanitary Engineering, Delft (Netherlands).
M. B. Abbott.
Terra et Aqua, No. 11, p 8-17, 1976. 13 fig, 12 ref.

Descriptors: *Mathematical models, *Mathematical studies, *Hydraulics, *Coastal engineering, Model studies, Research and development, Design, Hydrologic data, Mathematics, Environment.
Identifiers: *One dimensional, *Two dimensional, Model calibration, Three dimensional.

The paper described various aspects of mathematical models and their applications in hydraulics and coastal engineering problems. Mathematical models were advocated not as a replacement for physical modeling, but as a complementary tool to solve hydraulic problems. It was pointed out that the possibilities of making serious errors are much greater with the mathematical approach. It was also emphasized that mathematical modeling

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should be integrated closely with the rest of the investigation and design process which implied that the organizations best suited to build these models are the ones that possess extensive facilities for field measurements, laboratory testing, instrument development, data processing, and problem analysis. (Bhowmik-ISWS)
W77-02471

2B. Precipitation

SYNTHETIC DESIGN HYETOGRAPH AND RATIONAL RUNOFF COEFFICIENT,
American Consulting Services, Inc., Minneapolis, Minn. Environmental Engineering.
For primary bibliographic entry see Field 2E.
W77-02135

PROGRAM REPORT-FY 1975, ATMOSPHERIC AND GEOPHYSICAL SCIENCES DIVISION, PHYSICS DEPARTMENT.
California Univ., Livermore. Lawrence Livermore Lab.
Report UCRL-51444-75, October 8, 1975. 36 p, 11 fig, 42 ref, 2 append. ERDA W-7405-Eng-48.

Descriptors: *Projects, *Model studies, *Atmosphere, Mathematical models, Air pollution, Climatology, Nuclear wastes, Nuclear explosions, Remote sensing, Satellites(Artificial), Precipitation(Atmospheric), Forests, Dusts, Boundary layers, Meteorology.

The FY 1975 research program conducted by the Atmospheric and Geophysical Sciences Division and supporting segments at Lawrence Livermore Laboratory was reviewed briefly. Specific projects were described, and significant findings of the work were indicated. Unique numerical modeling capabilities in use and under development were described; these tools can be brought to bear on many energy-environmental relationships and problems. (Sims-ISWS)
W77-02157

PRECIPITATION ON INTERMOUNTAIN RANGELAND IN THE WESTERN UNITED STATES,
Agricultural Research Service, Tucson, Ariz. Southwest Watershed Research Center.
K. G. Renard, and D. L. Brakensiek.
In: Watershed Management on Range and Forest Lands. Proceedings, 5th Workshop of the United States/Australia Rangelands Panel, Boise, Idaho, June 15-22, 1975. Utah Water Research Laboratory, College of Engineering, Utah State University, Logan, Utah. p 39-59, 14 fig, 4 tab, 49 ref.

Descriptors: *Rainfall, *Rainfall disposition, *Rain gages, *Ranges, Seasonal, Rainfall intensity, Atmospheric pressure, Orography, Thunderstorms, Depth-Area-Duration analysis, Snowfall, Weather patterns, Photogrammetry, Precipitation(Atmospheric).

Precipitation varies widely in basin and range areas as well as major mountain areas in most of the western United States rangeland. Precipitation characteristics depend on the atmospheric moisture source, season, elevation and other factors. Much of the winter moisture in western rangeland areas is due to Pacific Ocean moisture carried into the area by prevailing westerly winds; such winds may cause orographic precipitation patterns with more rainfall and snow at high elevations. In other seasons, and especially in the southwestern U.S., atmospheric moisture results from slow air movement from the Bermuda high pressure area toward a thermal low pressure area; thunderstorms are common under such conditions. These and other rainfall events are discussed. Orographic precipitation patterns, redistribution of blowing snow and small thunderstorms contribute to the steep isohyetal gradients and limit rain gage data except at the point considered. Other topics considered include distribution of rainfall depths, thunderstorm patterns, low elevation winter precipitation, measurement by a dual gage system and by photogrammetry, and snowmelt studies. (Jahns-Arizona)
W77-02179

INADVERTENT WEATHER MODIFICATION,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 3B.
W77-02453

CLIMATIC INFERENCES FROM FORMER GLACIERS IN THE SOUTH-EAST GRAMPIAN HIGHLANDS, SCOTLAND,
Edinburgh Univ., (Scotland). Dept. of Geography.
For primary bibliographic entry see Field 2C.
W77-02467

THE ANNUAL VOLUME OF U.S. PRECIPITATION AND ITS VARIATIONS FOR THE PERIOD 1931-1971,
Eastern Washington State College, Cheney. Dept. of Physics.
J. R. Marshall.
Journal of Geophysical Research, Vol. 81, No. 24, p 4485-4486, August 20, 1976. 1 fig, 2 tab, 2 ref.

Descriptors: *Precipitation(Atmospheric), *Annual, *United States, Volume, Average, Fluctuations, Weather, Droughts, Wet seasons, Variability, Climatology.
Identifiers: *Precipitation variations.

The average annual volume of United States precipitation was calculated to be 5759 cu km for the 41-yr period from 1931 through 1971 inclusive. The standard deviation was + or - 7.1%. The extremes were 15% (1957) and -14% (1956). A significant conclusion was that wet years are more numerous than dry years; but, on the average, dry years are drier than wet years are wet. (Sims-ISWS)
W77-02483

A TECHNIQUE FOR ESTIMATING TROPICAL OPEN-OCEAN RAINFALL FROM SATELLITE OBSERVATIONS,
Hawaii Univ., Honolulu. Dept. of Meteorology.
B. J. Kilonsky, and C. S. Ramage.
Journal of Applied Meteorology, Vol. 15, No. 9, p 972-975, September 1976. 5 fig, 13 ref. NSF DES 74-22685.

Descriptors: *Remote sensing, *Rainfall, *Oceans, *Pacific Ocean, Satellites(Artificial), Analytical techniques, Data processing, Correlation analysis, Estimating, Clouds, Storms, Meteorology.

A procedure has been devised for extracting the frequency of highly reflective clouds from visual satellite picture mosaics of the tropical Pacific Ocean. Over the period May 1971 through April 1973, monthly frequencies of highly reflective clouds were statistically tested for a regression relationship with 820 station-months of coral island rainfall. The correlation coefficient was +0.75 while the line of regression passed near the origin and was equidistant from the abscissa and ordinate. The F calculated from an analysis of variance table was highly significant at the 1% level. The rainfall estimated from highly reflective cloud frequencies was then compared to other tropical Pacific Ocean climatological rainfall estimates. (Sims-ISWS)
W77-02484

THE HAILPAD CALIBRATION FOR ITALIAN HAIL DAMAGE DOCUMENTATION,
Ufficio Centrale di Ecologia Agragia e difesa delle Piante coltivate dalle Avversita Meteoriche, Rome (Italy).
D. Vento.
Journal of Applied Meteorology, Vol. 15, No. 9, p 1018-1022, September 1976. 4 fig, 3 tab, 10 ref.

Descriptors: *Hail, *Measurement, *Equipment, *Calibrations, Sampling, Precipitation(Atmospheric), Instrumentation, Agriculture, Hazards, Damages, Foreign countries, Meteorology.
Identifiers: *Hailpads, *Hailpad calibration, *Italy.

After a synthesis of the characteristics of the hailpad used by the Central Office of Agrarian Ecology, Italy, the calibration method was described, including the formula, data, and necessary techniques, together with the tables and more significant graphs. The method by which the energy index of a hailstorm is evaluated was also specified. (Sims-ISWS)
W77-02486

MOLECULAR STUDIES OF THE ICE-FORMING CAPABILITIES OF DIFFERENT SURFACES,
Gidrometeorologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 3B.
W77-02487

THE SURVIVAL OF ICE PARTICLES FALLING FROM CIRRUS CLOUDS IN SUBSATURATED AIR,
California Univ., Los Angeles. Dept. of Meteorology.
W. D. Hall, and H. R. Pruppacher
Journal of the Atmospheric Sciences, Vol. 33, No. 10, p 1995-2006, October 1976. 9 fig, 4 tab, 45 ref, 1 append. NSF DES75-09999.

Descriptors: *Ice, *Cloud physics, *Model studies, Clouds, Crystals, Particle shape, Sublimation, Evaporation, Equations, Mathematical models, Temperature, Air temperature, Humidity, Moisture, Meteorology.
Identifiers: *Cirrus clouds, Ice particles.

A theoretical study was carried out to determine the relevant microphysical processes which control the survival distance of ice particles falling from cirrus clouds in subsaturated air and to determine the atmospheric conditions which are necessary for such particles to 'seed' lower level supercooled clouds and thereby initiate glaciation. Differential equations were developed which describe the heat and mass transfer during the evaporation of cirrus ice particles. In these equations, forced convection and kinetic effects were included. Spherical, columnar, and plate-like ice particles were considered. The effect of radiative heat exchange between an ice particle and its environment was studied in terms of maximum and minimum physical limits for the upward and downward radiation fluxes. Using these limits and the known emission and absorption properties of ice, it was concluded that radiative heat transfer changes the survival distance of columnar ice crystals falling from cirrus clouds by less than 10% if the relative humidity of the environmental air is less than 70%. Considering the radiative effects and a wide range of values for the initial size and ice particle bulk density and for the temperature and humidity conditions of the ambient air, the present theoretical model showed that ice particles could survive distances of up to 2 km when the relative humidity with respect to ice was below 70% in a typical mid-latitude atmosphere. Larger survival distances are possible only if the ambient air has relative humidities larger than 70%. The theoretical model was compared to several field observations on evaporating cirrus ice particles. Good agreement was found with observational data when the atmospheric temperature and humidity profiles were available for the site at which the ice particles were sampled. (Sims-ISWS)
W77-02488

EVOLUTION OF RAINDROP SPECTRA WITH COLLISION-INDUCED BREAKUP,
Toronto Univ. (Ontario). Dept. of Physics.
R. List, and J. R. Gillespie.
Journal of the Atmospheric Sciences, Vol. 33, No. 10, p 2007-2013, October 1976. 3 fig, 23 ref.

Descriptors: *Raindrops, *Cloud physics, *Model studies, Mathematical models, Distribution, Particle size, Precipitation(Atmospheric), Laboratory tests, Coalescence, Rain, Equations, Meteorology.
Identifiers: *Raindrop breakup, Raindrop spectra, Drop collisions, Raindrop size, Rain processes.

A numerical model was set up to study the evolution of raindrop spectra by collision-induced breakup as measured in the laboratory. The main conclusion was that drops with diameters larger than 2-3 mm, falling in a population of smaller drops typical of natural rain, break up in comparatively short times (1-5 min in rainfalls of 100 mm/h). The presence of large drops (4-6 mm) in (cold) rain produced by the Wegener-Bergeron-Findeisen mechanism through melting of ice particles can be attributed to the short time available for large drops to break up in sufficient numbers during the time of fall after melting. Large drops are scarce in (steady-state) warm rain because they break up in collisions and rarely reach diameters larger than 2.5 mm. Hence, the standard notion of a critical diameter of 5-6 mm which raindrops are supposed to reach before breakup due to aerodynamic instability is no longer acceptable. (Sims-ISWS)
W77-02489

USE OF THE LANDSAT-2 DATA COLLECTION SYSTEM IN THE COLORADO RIVER BASIN WEATHER MODIFICATION PROGRAM,
Bureau of Reclamation, Denver, Colo. Div. of Atmospheric Water Resources Management.
A. M. Kahan.
Available from the National Technical Information Service, Springfield, VA 22161 as N76-16525, Price codes: A02 in paper copy, A01 in microfiche. Report NASA-CR-146035, March 31, 1975. 11 p, 2 fig, 2 tab. NASA LANDSAT Inv. No. 23030.

Descriptors: *Remote sensing, *Equipment, *Instrumentation, Precipitation(Atmospheric), *Weather modification, Snow cover, Water resources, Water temperature, Winds, Weather data, Data collections, Hydrologic data.
Identifiers: *LANDSAT, *Data collection platforms, Satellite data collection systems.

This report described the progress made during the initial quarter of the Bureau of Reclamation's LANDSAT follow-on investigation. This investigation was conducted within the Bureau's Colorado River Basin Weather Modification Program, with primary emphasis away from the demonstration and testing of the LANDSAT Data Collection System toward its use as an operational tool in monitoring weather conditions for cloud seeding control. Five LANDSAT Data Collection Platforms were operated during the reporting period and proved to be reliable weather resistant units suitable for the collection of hydrometeorological data from remote, severe winter environments. The data relayed by LANDSAT satellite were available in near real-time for project forecasting. A significant accomplishment toward improving the LANDSAT DCS was the development of a system for averaging wind speed and wind direction data and on-site storage of hourly averaged data. (Sims-ISWS)
W77-02500

USE OF RADAR INFORMATION IN DETERMINING FLASH FLOOD POTENTIAL,
National Weather Service, Garden City, N. Y. Eastern Region.
S. E. Wasserman.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-250 071, Price codes: A02 in paper copy, A01 in microfiche. Technical Memorandum NWS ER-60, December 1975. 10 p, 3 tab, 4 ref.

Descriptors: *Flash floods, *Flood forecasting, *Warning systems, *Radar, Rainfall, Floods, Remote sensing, Precipitation(Atmospheric), Rates, *Excessive precipitation, Measurement, Weather, Runoff, Meteorology, Hydrology.
Identifiers: *Weather radar.

An improved method was designed for the use of radar information by operational people in the flash flood program. Radar estimates of maximum precipitation were compared objectively with the minimum, three-hour precipitation amounts required for flash flooding. Through this comparison, areas that have a potential for flash flooding were determined. Information concerning the minimum rainfall required for flash flooding, called Flash Flood Guidance, was prepared and disseminated daily by River Forecast Centers. (Sims-ISWS)
W77-02509

2C. Snow, Ice, and Frost

ARIZONA'S FROZEN ASSETS: SNOWPACK MANAGEMENT,
Arizona Univ., Tucson. School of Renewable Natural Resources.
D. B. Thorud, and P. F. Ffolliott.
In: 19th Annual Arizona Watershed Symposium Proceedings, Report No. 7, p 31-34, Sept. 1975. 17 ref. OWRT A-045-ARIZ(6).

Descriptors: *Snowpacks, *Snow management, *Arizona, *Melt water, *Forest management, *Surface runoff, Water yield, Water yield improvement, Canopy.
Identifiers: *Runoff efficiency.

Reviews are presented of various snow research projects in Arizona over the past decade to demonstrate possibilities for enhancing snowmelt water yield, especially from forested watersheds. Between 1 1/4 and 2 1/2 million acre-feet of water can be in storage as snowpacks just before snowmelt runoff in early spring; a 10% increase in snowmelt water yields would mean an additional 125,000 to 250,000 acre-feet of water in the state. Research indicates that forest management practices affect the snowpack and cause increased snowmelt runoff; thinning and clearing of forest overstories to increase snowmelt water yield can be made compatible with timber, forage and wildlife production as well as recreational use. Development of forest management guidelines is discussed. Several process and theoretical studies were conducted to determine the relationships between snowpack conditions and forest overstories. Runoff efficiency, defined as the portion of a snowpack which is converted into recoverable surface water, was studied in several watersheds. Efficiencies appear to vary from year to year; however, there is a general trend of low efficiency at the start of a melt season, higher toward the middle, and gradually lower efficiency toward the season's end. (See also W77-02104) (Jahns-Arizona)
W77-02106

ARIZONA'S FROZEN ASSETS: VOLUMETRIC FORECASTS FROM SNOWPACK,
Arizona Water Commission, Phoenix.
E. Kirdar.
19th Annual Arizona Watershed Symposium Proceedings, Report No. 7, p 37-38, Sept. 1975.

Descriptors: *Watershed management, *Arizona, *Snow management, *Snowpacks, *Volumetric analysis, Snowmelt, Runoff, Runoff forecasting, Water resources development, Project planning, Water yield.
Identifiers: *Salt River Valley(Arizona), *Salt River Project, *Volumetric forecasting.

Snowfall is the main form of precipitation from winter storms which account for some 75% of the mean annual runoff in the three major drainage basins of the Salt River Valley in Arizona. About 90% of the total watershed lies below 7000 feet, and snowfall here tends to melt rapidly. Large runoff volumes may result in relatively short periods of time, causing major flooding potential if reservoir storage is high. The aims of the Salt River Project include providing sufficient water for municipal, agricultural and other needs of the valley, insuring reservoir carry-over, maximizing hydroelectric generation during summer months when power demand is high, and minimizing required pumping. The formulation of a Project Reservoir Operating Plan is discussed and the Index Forecast Method of predicting seasonal runoff outlined. Forecasting involves correlations of historical runoff with indices of important determinants of runoff for the area. Seasonal volumetric runoff forecasts are provided using bi-weekly snow survey information from mid-January to April 1. Other watershed information needed for management decisions is also discussed. (See also W77-02104) (Jahns-Arizona)
W77-02108

MEASUREMENTS OF THE TURBULENT BOUNDARY LAYER UNDER PACK ICE,
Washington Univ., Seattle. Dept of Geophysics.
M. G. McPhee, and J. D. Smith.
Journal of Physical Oceanography, Vol. 6, No. 5, p 696-711, September 1976. 17 fig, 7 tab, 23 ref. ONR N-00014-67-0103-0021, ONR N-00014-67-0103-0034.

Descriptors: *Boundary layers, *Turbulence, *Ice cover, Sea ice, Turbulent boundary layers, Model studies, Mathematical models, On-site investigations, Oceans, Currents(Water), Flow, Current meters, Measurement, Friction, Oceanography.

The mean and turbulent flow structure under pack ice was measured during the 1972 AIDJEX pilot study with small mechanical current meter triplets at eight levels in the planetary boundary layer. CTD profiles showed a well-mixed layer of nearly neutral stability to about 35 m, bounded below by a strong pycnocline. The skin friction velocity u* was determined by measuring the Reynolds stress at 2 and 4 m below the ice (beyond the surface layer) and from consideration of other terms in the mean momentum equation. Local pressure gradients and advective acceleration due to topography could not be ignored; when an estimate of the effect was included, u* was 1.0 + or - 0.1 cm/s when the ice velocity relative to the ocean was 24 cm/s. With the proper coordinate transformation, the planetary boundary layer of the ocean resembles that of the atmosphere. Composite averages of non-dimensional Reynolds stress and mean flow in the ocean, when compared with recent models of a neutrally buoyant, horizontally homogeneous atmosphere, fit the model predictions fairly well. However, the lateral component (perpendicular to surface stress) departed markedly from those predictions, indicating that form drag associated with pressure ridge keels is important. Peaks in spectra of vertical velocity were used to estimate eddy viscosity proportional to mixing length at eight levels in the outer layer. Results agreed well with the models, but this eddy viscosity did not provide a simple relation between Reynolds stress and mean flow shear. (Sims-ISWS)
W77-02138

KAISER EFFECT IN SNOW,
Montana State Univ., Bozeman.
C. C. Bradley, and W. St. Lawrence.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A022 528, Price codes: A02 in paper copy, A01 in

microfiche. Report ARO 11042.4-EN, 1975. Reprint from the Proceedings of the Grindelwald Symposium on Snow Mechanics held April 1974. IAHS-AISH publication No. 114, p 145-154, 1975. 5 fig, 3 ref. Army DA-ARO-D-31-124-73-G175.

Descriptors: *Snow, *Stress, *Sounds, Laboratory tests, Physical properties, Tension, Pressure, Loads(Forces), Graphical analysis, Mechanics.
Identifiers: *Kaiser effect(Snow).

Acoustical signals emanating from stressed snow indicated that snow, in common with other crystalline materials, exhibits Kaiser effect or 'memory' of previous stress. This memory can be quite specific as to the magnitude of the prestress. It also appears to be usable for identifying the mode of the prestress (compressive or tensile). These conclusions were drawn from laboratory experiments in which dimensioned snow columns were subjected to uniaxial dead loads both in compression and in tension, and then restressed after relaxation periods. Experiments on the longevity of the memory function indicated that most of the decay takes place in the first 6 h, but that it is still detectable after relaxation periods of up to 24 h. (Sims-ISWS)
W77-02154

LOCK WALL DEICING WITH WATER JETS: FIELD TESTS AT SHIP LOCKS IN MONTREAL, CANADA AND SAULT STE. MARIE, MICHIGAN,
National Research Council of Canada, Ottawa (Ontario). Div. of Mechanical Engineering; and National Research Council of Canada, Ottawa (Ontario). Gas Dynamics Lab.
For primary bibliographic entry see Field 8C.
W77-02156

ECOLOGICAL IMPACTS OF SNOWPACK AUGMENTATION IN THE SAN JUAN MOUNTAINS OF COLORADO.
Colorado State Univ., Fort Collins. Coll. of Forestry and Natural Resources.
For primary bibliographic entry see Field 3B.
W77-02160

WATER FLOW IN GLACIERS: JOKULHLAUPS, TUNNELS AND VEINS,
Bristol Univ. (England). H. H. Wills Physics Lab.
J. F. Nye.
Journal of Glaciology, Vol. 17, No. 76, p 181-207, 1976. 13 fig, 1 tab, 25 ref, 3 append.

Descriptors: *Glaciers, *Melt water, *Lakes, *Blowouts, Flow, Water, Tunnels, Glaciology, Ice, Theoretical analysis, Thermodynamic behavior, Heat transfer, Floods, Melting, Equations.
Identifiers: *Iceland, *Lake Grimsvotn, Ice-dammed lake, *Jokulhlaups.

The physics of water flow within and under glacier ice was examined with special reference to the periodic catastrophic outbursts of water (jokulhlaups) from the subglacial lake Grimsvotn, Vatnajokull, Iceland. The lake is sealed until it reaches a critical level which enables it to lift the glacier helped by a hydrostatic cantilever effect. The differential equations for non-steady water flow in a subglacial tunnel were derived and applied to the 1972 Grimsvotn outburst. The discharge time relation observed during the growth stage and the abrupt ending of the flood were both very well accounted for by a theory which is insensitive to the details of the subglacial tunnel system. The steady state, in which an intergranular vein or tunnel is simultaneously melted open by frictional heat and closed by plastic deformation, may be stable or unstable according to the conditions imposed at the ends. This explains why the flow of water in a vein does not normally increase unstably as in a jokulhlaup. An ice-dammed lake does not drain away through the vein system because the driving force on the vein-water is towards the lake rather than away from it. (Humphreys-ISWS)
W77-02458

THE EFFECT OF SUBGLACIAL CHEMICAL PROCESSES ON GLACIER SLIDING,
California Univ., Los Angeles. Dept. of Geology.
B. Hallet.
Journal of Glaciology, Vol. 17, No. 76, p 209-221, 1976. 4 fig, 17 ref, 1 append. NSF GA 40497X.

Descriptors: *Glaciers; *Ice, *Ice-water interfaces, Movement, Glaciology, Temperate, Subarctic, Theoretical analysis, Surfaces, Boundaries(Surfaces), Velocity, Equations, Freezing, Melting.
Identifiers: *Glacier sliding, Chemical processes, Chemical deposits.

The glacier sliding theory of Nye was modified to include the effect of solutes in subglacial regelation waters on the sliding process. Motivation for this development stems from studies of subglacially formed chemical deposits that appear to be widespread on rock surfaces recently exposed by retreating temperate glaciers. These deposits indicate clearly that considerable local concentration of solutes commonly occurs subglacially as a result of the selective rejection of solutes into the melt during the freezing associated with regelation sliding. Because solutes accumulate where regelation waters refreeze, they tend to lower the temperature there and, hence, inhibit the heat transport away from these areas which is essential for regelation sliding. For a simple sinusoidal bed and solute distribution in the regelation water film, the modified theory showed that a maximum excess of solutes of, for example, several millimoles/l of dissolved CaC03 along lee surfaces relative to stoss surfaces impedes basal sliding significantly, especially if the bed roughness wavelength does not exceed approximately one meter. (Humphreys-ISWS)
W77-02459

THE BEARING CAPACITY OF FLOATING ICE PLATES SUBJECTED TO STATIC OR QUASI-STATIC LOADS,
Princeton Univ., N. J. Dept. of Civil Engineering.
A. D. Kerr.
Journal of Glaciology, Vol. 17, No. 76, p 229-268, 1976. 28 fig, 3 tab, 153 ref.

Descriptors: *Reviews, *Ice, *Mechanical properties, *Strength of materials, Publications, Documentation, Ice loads, Loads(Forces), Ice cover, Elasticity(Mechanical), Plasticity, Shear, Bearing strength, Flexibility, Load distribution, Analytical techniques, On-site tests, Laboratory tests, Analysis, Equations, Bibliographies.
Identifiers: Floating ice plates.

This paper reported a critical survey of the literature on the bearing capacity of floating ice plates. The report consisted of a discussion of general questions, a critical survey of analytical attempts to determine the bearing capacity of floating ice plates, and a survey of field and laboratory tests on floating ice plates and their relation to the analytical results. It concluded with a systematic summary of the results, a discussion of observed shortcomings, and suggestions for needed investigations. (Humphreys-ISWS)
W77-02460

THE APPLICATION OF FRACTURE MECHANICS TO THE PROBLEM OF CREVASSE PENETRATION,
Cambridge Univ., (England). Dept. of Engineering.
R. A. Smith.
Journal of Glaciology, Vol. 17, No. 76, p 223-228, 1976. 4 fig, 7 ref.

Descriptors: *Glaciers, *Cracks, *Model studies, *Ice, Mathematical models, Theoretical analysis, Failure(Mechanics), Rupturing, Depth.
Identifiers: *Crevasses.

The elastic stress intensity factor is a paramter used in fracture mechanics to describe stress conditions in the vicinity of the tip of a sharp crack. By superimposing solutions of stress intensity factors for different loading conditions, equations were derived which model crevasses in ice. Solutions were presented for the theoretical depth of isolated crevasses, free from or partially filled with water. Close agreement existed with a previous calculation by Weertman using a different technique. The effect of crevasse spacing was investigated. It was demonstrated that closer spacing always reduces crevasse depth, but, over a wide range of spacing, the predicted variation in depth is slight. (Humphreys-ISWS) (See also W74-09335)
W77-02461

MEASUREMENTS OF ACOUSTIC PROPERTIES OF HARD-PACK SNOW,
Montana State Univ., Bozeman. Dept. of Civil Engineering and Engineering Mechanics.
T. E. Lang.
Journal of Glaciology, Vol. 17, No. 76, p 269-276, 1976. 8 fig, 1 tab, 5 ref. NSF GA-3943, DA-ARO-D-31-124-71-G59.

Descriptors: *Snowpacks, *Acoustics, *Sound waves, Snow, Physical properties, *Measurement, On-site tests, Laboratory tests, Equipment, Analysis, Frequency.

Three experiments were conducted to assess acoustic properties of hard-pack snow. One test involved transmission of acoustic signals in the frequency range 100-20,000 Hz through natural snowpack in order to measure signal loss of a point acoustic source. It was found that at all frequencies, the relatively high-energy input signal decays rapidly by energy dissipation, with nominal dissusion occurring at large distances from the source. Signal persistence is greatest in the frequency range 100-200 Hz. In a second test, acoustic bursts in snow columns under deformation were recorded. Spectrum analysis in the frequency range 500-14,000 Hz revealed dominance of signal amplitudes at frequencies between 1000 and 10,000 Hz. This dominance was attributed to the strong attenuation properties of snow and suggests the use of waveguide or collector techniques to monitor natural acoustic emissions in snowpack. In a third test, several waveguide geometries and materials were evaluated for their acoustic signal interception and transmission characteristics. In general, metallic waveguides show the least attenuation of the configurations tested. (Humphreys-ISWS)
W77-02462

SNOW PRESSURE ON RIGID OBSTACLES,
Washington Univ., Seattle. Geophysics Program.
D. McClung.
Journal of Glaciology, Vol. 17, No. 76, p 277-285, 1976. 8 fig, 8 ref.

Descriptors: *Snow, *Load distribution, *Physical properties, Pressure, Loads(Forces), Viscous flow, Movement, Analysis, Theoretical analysis, Dynamics, Drag, Deformation, Snowpacks.
Identifiers: Retaining structures.

A continuum mechanical formulation of snow pressure was given. The snow pressure against retaining structures on slopes was considered in two separate parts: (1) the static component due to the regression of transverse expansion, and (2) the dynamic component due to the interruption of the creep (internal deformation) and glide (slip of the entire snow cover over the ground). Snow pressure calculations made using non-linear viscous constitutive equations were given for the plane

strain-rate problem of a rigid barrier on a snow-covered slope. These calculations were compared with the previous formulation of snow pressure given by Haefeli for the expected range of boundary conditions for the structure and for the snow-earth interface. The results showed that the original formulation by Haefeli gives a dynamic component of similar magnitude to the present calculations. Substantial differences were apparent when the up-slope distances for interruption of the creep and glide processes were compared. Any slope geometry, barrier geometry, distribution of density, and distribution of ground roughness are easily incorporated into the calculations. (Humphreys-ISWS)
W77-02463

THE ORIGIN OF GLACIALLY FLUTED SURFACES - OBSERVATIONS AND THEORY,
University of East Anglia, Norwich (England). School of Environmental Sciences.
G. S. Boulton.
Journal of Glaciology, Vol. 17, No. 76, p 287-309, 1976. 18 fig, 17 ref.

Descriptors: *Glaciology, *Geomorphology, *On-site investigations, Ice, Movement, Till, Glaciers, Cirques, Topography, Shape, Theoretical analysis, Boulders.
Identifiers: *Alps, *Flutes, *Iceland, *Spitsbergen, *Norway, Subglacial, Flute formation.

Studies of fluted surfaces beyond the margins of glaciers in Spitsbergen, Iceland, Norway, and the Alps show that almost all fluted surfaces emanate from rigid obstructions, commonly boulders in till. Field relations of flutes were described, and it was shown that a relationship exists between flute height and the height of the initiating obstruction. Subglacial observations indicated that flutes form when till is intruded into tunnels which tend to open up in the lee of obstacles. The pattern of strain implied by this process was shown to be reflected by micro- and macro-fabrics in the till. The commonly found occurrence of an average spacing between flutes does not arise because of some rhythmic or periodic mechanism in the glacier but is produced by the random seeding of boulders which themselves generate flutes. It was suggested that the term 'flute' be used as a genetic rather than a descriptive term and be restricted to long parallel-sided ridges which reflect accurately the direction of ice movement and which form when deformable subglacial materials are intruded into tunnels which tend to open up on the lee sides of single rigid obstructions on the glacier bed. (Humphreys-ISWS)
W77-02465

A THEORETICAL ANALYSIS OF THE FORMATION OF GLACIAL FLUTES,
University of East Anglia, Norwich (England). School of Environmental Sciences.
E. M. Morris, and L. W. Morland.
Journal of Glaciology, Vol. 17, No. 76, p 311-323, 1976. 5 fig, 1 tab, 20 ref.

Descriptors: *Glaciology, *Geomorphology, *Ice, Movement, Till, Glaciers, Cirques, Theoretical analysis, Topography, Shape, Equations, Mathematical studies, Glacial sediments.
Identifiers: *Flutes, *Iceland, *Flute formation.

In an analysis of the formation of flutes by subglacial cavities, the flute-forming sediment was treated as a linear isotropic elastic material prior to failure, which occurs when Coulomb's law is satisfied. The maximum height of a flute was derived as a function of the mechanical properties of its material, and the factors controlling the variation of height with distance along the flute were analyzed. The flow pattern of material during the formation of a flute which the theory suggests was similar to the patterns which have been determined in a till fabric analysis of flutes near Breioamerkurjokull, Iceland. (Humphreys-ISWS)
W77-02466

CLIMATIC INFERENCES FROM FORMER GLACIERS IN THE SOUTH-EAST GRAMPIAN HIGHLANDS, SCOTLAND,
Edinburgh Univ., (Scotland). Dept. of Geography.
J. B. Sissons, and D. G. Sutherland.
Journal of Glaciology, Vol. 17, No. 76, p 325-346, 1976. 4 fig, 7 tab, 34 ref.

Descriptors: *Glaciers, *Climatology, *Precipitation(Atmospheric), Firn, Glaciation, Ablation, Albedo, Glaciology, Geomorphology, Snow, Snowfall, Temperature, Solar radiation, Quaternary period, Climatic data, Analysis, Foreign countries.
Identifiers: *Scotland, *Younger Dryas.

Altitudes, lengths, areas, maximum thicknesses, and volumes of 27 glaciers that built up in a small area of the Scottish Highlands during the Loch Lomond (Younger Dryas) stadial were given. The influence of direct radiation on the glaciers was calculated taking into account transmissivity of the atmosphere, glacier aspect and surface gradient, and the albedos of ice and snow. Equilibrium firn lines for the glaciers were determined. The computed regional firn line, incorporating the influence of direct radiation, had a gradient of 14.5 m/km. Former precipitation values were based on an equation for average annual mass balances of the glaciers during the stadial that incorporates glacier altitude, regional ablation gradient, direct radiation, the influence of avalanching and blowing of snow, and final glacier volume. Average July and January sea-level temperatures of 6C and at least -8C, respectively, were inferred. Snowfall was principally associated with south-east winds and was similar in total to present day but rather differently distributed. Cloud amounts, at least in summer, were greater than now. A more vigorous atmospheric circulation with many depressions moving along more southerly tracks than now may have been related to the junction of polar water and North Atlantic Drift water in the immediate vicinity of the British Isles. (Humphreys-ISWS)
W77-02467

AUTOMATED SEISMIC MONITORING SYSTEM FOR LAKE MICHIGAN ICE STUDIES,
Wisconsin Univ., Milwaukee. Dept. of Geological Sciences.
R. W. Taylor, J. P. Kovach, and N. P. Lasca.
Journal of Glaciology, Vol. 17, No. 76, p 347-350, 1976. 2 fig, 1 ref. NSF KG-41011.

Descriptors: *Lake ice, *Lake Michigan, *Data processing, *Seismic properties, Seismic waves, Instrumentation, Ice, Data storage and retrieval, Monitoring, Basic data collections, Automation.

A simple, relatively inexpensive system for signal recovery in retrospect was designed to record lake-ice seismic events. The system is broad-band, D.C. to 100 Hz, light-weight and may be added to any existing data-acquisition equipment. The system may be used (1) to initiate high speed paper recordings in the field, (2) to store transient events on magnetic tape while in the field, or (3) for the unattended laboratory-recovery of transient events from a continuous field recording. Continuous, high resolution, broad-band recordings of seismic events occurring in lake ice over a period of weeks may be stored on a single reel of magnetic tape. The initial cost of the device is rapidly equaled by the savings in tape cost and man hours expended in signal recovery. (Humphreys-ISWS)
W77-02468

A NOTE ON THE CONTRIBUTION OF RIME AND SURFACE HOAR TO THE ACCUMULATION ON THE ROSS ICE SHELF, ANTARCTICA,
Nevada Univ., Reno. Desert Research Inst.
G. O. Linkletter, and J. A. Warburton.
Journal of Glaciology, Vol. 17, No. 76, p 351-354, 1976. 1 fig, 1 tab, 14 ref. NSF OPP73-05843-A01.

Descriptors: *Antarctic, *Ice, *On-site investigations, *Fog, Frost, Snow, Snow packs, Snow surveys, Rime, Surfaces.
Identifiers: *Ross Ice Shelf.

Observations and measurements made on the Ross Ice Shelf during 1974 suggested that rime and surface hoar deposited on the surface during fogs may contribute 5-10% of the annual accumulation. Layers formed during such fogs may be mistaken for depth hoar layers in the snow-pack. (Humphreys-ISWS)
W77-02469

A CONCISE METHOD FOR ANALYZING THE ICE-MELTING PERFORMANCE OF A HEATED DISC,
Sun Oil Co., Richardson, Tex. Science and Technology Div.
J. F. Lea.
Journal of Glaciology, Vol. 17, No. 76, p 355-358, 1976. 1 fig, 2 ref.

Descriptors: *Ice, *Melting, *Mathematical studies, Heat transfer, Temperature, Theoretical analysis, Equations, Analytical techniques, Mathematics, Numerical analysis.
Identifiers: *Heated disc.

Shreve (1962) evaluated the performance of solid-nose hotpoints of various geometries. A more concise method for analysis of the special case of a flat disc melting into ice was presented. In contrast to the numerical solution presented by Shreve, this method resulted in a closed analytical solution, based on constant properties, which is corrected using a property ratio scheme. This technique allowed the substitution of various fluid properties into the solutions as might be required when considering contaminated or saline ice or other liquids. Shreve's method would require some additional numerical work to evaluate various properties because the temperature dependence of the viscosity of water is integrated into the results. Results obtained for the flat disc using this method were shown to compare favorably with Shreve's indicating that this type of analysis may be applicable to other meltunit geometries. (Humphreys-ISWS)
W77-02470

ICE MOVEMENT AND DISTRIBUTION IN THE BERING SEA FROM MARCH TO JUNE 1974,
Alaska Univ., College. Inst. of Marine Science.
R. D. Muench, and K. Ahlnas.
Journal of Geophysical Research, Vol. 81, No. 24, p 4467-4476, August 20, 1976. 12 fig, 1 tab, 14 ref. NOAA 5-35190.

Descriptors: *Sea ice, *Ice cover, Movement, *Distribution, Winds, Surveys, Remote sensing, Satellites(Artificial), Distribution patterns, Heat transfer, Ice, Circulation, Water circulation, Oceanography.
Identifiers: *Bering Sea, *Ice movement.

Ice distribution and motion in the Bering Sea from March to June 1974 were observed by imagery from the NOAA 2 and 3 VHRR (very high resolution radiometer) satellites. The southerly ice edge was nearly constant in position from Marsch to mid-May, when ice disintegration had progressed to a point where the edge was undefined. Ice movement was southerly in response to northerly winds until late April, after which variable ice motion reflected variable winds. The southerly motion created regions of ice divergence south of islands and along east-west trending southern coasts. In some areas such as the Bering Strait, water motion exerted sufficient stress on the ice to balance the wind stress, resulting in stationary ice of northerly ice motion. The Bering Sea ice cover is conceptualized as northern source and southern

sink regions connected by an intermediate zone of southerly ice motion. A mean observed southerly ice motion of 18 cm/s requires heat losses for ice formation of the order of 10 g-cal/sq m/s or an order of magnitude greater if most ice is assumed to form in divergent areas covered by thin ice or that have open water. These values are in agreement with previous estimates of sea-air heat flux in the Arctic. (Sims-ISWS)
W77-02482

AN OPERATIONAL APPLICATION OF SATELLITE SNOW COVER OBSERVATIONS - NORTHWEST UNITED STATES,
Bonneville Power Administration, Portland, Oreg.
J. P. Dillard.
Available from the National Technical Information Service, Springfield, VA 22161 as N76-16599, Price Codes: A02 in paper copy, A01 in microfiche. Report NASA CR-144723, November 1975. 32 p, 2 fig, 3 tab, 3 ref, 1 append. NASA S-53877.

Descriptors: *Remote sensing, *Snow cover, *Pacific northwest U.S., *Satellites(Artificial), Surveys, Mapping, Water resources, Snow, Precipitation(Atmospheric), Snowmelt, Runoff, Snow surveys, Aircraft, Watersheds(Basins), Rivers, Water levels, Hydroelectric power, Powerplants.
Identifiers: *LANDSAT.

LANDSAT-1 imagery showing extent of snow cover was collected for the 1973 and 1974 snowmelt seasons for the following Columbia River Basins: North Santiam River Basin above Detroit Dam, Oregon; Upper Snake River Basin above Palisades Dam, Idaho; and Boise River Basin above Lucky Peak Dam, Idaho. The primary objective of this study was to map snowlines and determine the aerial snow cover using satellite data. A secondary objective was to compare satellite snow mapping products to products from conventional information sources. A long-term objective was to develop or to modify methods in an operational mode to incorporate satellite-derived snow cover data to improve runoff forecasting techniques. Available satellite data were successfully analyzed by radiance thresholding to determine snowlines and the attendant snow-covered area. Conventional data sources were used to verify the data obtained from satellite imagery. A computer model capable of reconstituting streamflow was one such source used for this verification. Verification of the LANDSAT-1 data was generally good, although there were exceptions. Two major problems were (1) a lack of adequate cloud-free satellite imagery of high resolution, and (2) need for a way to determine snowlines in forested areas. (Sims-ISWS)
W77-02496

2D. Evaporation and Transpiration

OPTIMIZATION OF WATER USE EFFICIENCY UNDER HIGH FREQUENCY IRRIGATION--I. EVAPOTRANSPIRATION AND YIELD RELATIONSHIP,
New Mexico State Univ., University Park. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 3F.
W77-02103

RELATIVE IMPORTANCE OF SOIL RESISTANCE AND PLANT RESISTANCE IN ROOT WATER ABSORPTION,
Agricultural Research Service, Florence, S. C. Southern Region.
D. C. Reicosky, and J. T. Ritchie.
Soil Science Society of America Journal, Vol. 40, No. 2, p 293-297, March-April, 1976. 3 fig, 1 tab, 32 ref.

Descriptors: *Soil-water-plant relationships, *Moisture uptake, *Soil water, *Transpiration, Water loss, Leaves, Corn, Sorghum, Nutrients, Root zone, Absorption, Sands, Soil types, Clays, Hydraulic conductivity.

The relative importance of soil and plant resistances and their influence on leaf water potential and transpiration over a range of measured hydraulic conductivities and matric potentials commonly encountered in Varina sandy loam and Houston Black Clay was evaluated. Experiments were conducted on corn grown in a greenhouse and sorghum grown in a field. Soil water potentials, leaf water potentials, and transpiration rates were determined to evaluate the magnitude of the combined soil and plant resistances to water flow in the plant system. Results show that when root density was not unusually low, plant resistance to water transport was much larger than soil resistance until a higher threshold soil hydraulic conductivity was reached. These findings emphasize the need to consider plant resistance in moisture uptake calculations when using equations that evaluate water potential gradients along the water flow path. (Jamail-Arizona)
W77-02118

EFFECT OF ABSCISIC ACID AT DIFFERENT LEVELS OF SOIL WATER POTENTIAL ON THE TRANSPIRATION OF ZEA MAYS,
Aarhus Univ. (Denmark). Inst. of Plant Physiology.
For primary bibliographic entry see Field 3B.
W77-02121

WATER FLOW IN WHEAT SEEDLINGS AFTER SMALL WATER DEFICITS,
Lund Univ. (Sweden). Dept. of Plant Physiology.
A. Nordin.
Physiologia Plantarum, Vol. 37, No. 2, p 157-162, 1976. 7 fig, 2 tab, 19 ref.

Descriptors: *Moisture stress, *Moisture uptake, *Moisture deficit, *Moisture content, *Moisture availability, Root zone, Root systems, Stress, Wheat, Transpiration, Hygrometry, Moisture meters, Leaves, Stomata, Conductivity, Ion transport, Water balance.

The after-effects of slightly increased leaf water deficits on water flow through wheat seedlings are discussed. Transpiration and water uptake were measured simultaneously using a micro-wave hygrometer and a recording potometer. It is known that water deficits can be achieved by cooling the roots while the shoots are subject to conditions for high transpiration rate. An experiment was conducted to find out if root cooling without accompanying leaf stress, will induce changes in water flow. Wheat seedlings were kept with the roots at one degree centrigrade in nutrient solution and the shoots in air at 20 degrees centigrade for 24 hours. This treatment induced a 2 percent decrease in relative water content of the leaves which rapidly disappeared after a return to normal root temperatures. The magnitude of the after-effects varied with leaf water content, though some contribution of root cooling to the after-effects cannot be excluded. The decreased water flow through the plant after removal of stress can be attributed mainly to increased stomatal resistance and not to effects on root conductivity. The increased stomatal resistance appears linked to increased membrane permeability rather than to a decrease in the active mechanism for ion uptake. (Jamail-Arizona)
W77-02172

SENSITIVITY AND MODEL VARIANCE ANALYSIS APPLIED TO SOME EVAPORATION AND EVAPORTRANSPIRATION MODELS,
Agricultural Research Service, Chickasha, Okla.
G. Coleman, and D. G. DeCoursey.
Water Resources Research, Vol. 12, No. 5, p 873-879, October 1976. 2 fig, 2 tab, 16 ref.

Descriptors: *Analytical techniques, *Mathematical models, Forecasting, *Evaporation, *Evapotranspiration, Model studies.
Identifiers: *Sensitivity analysis, *Error variance analysis, Finite difference.

Variable sensitivity and error variance of six evaporation and evapotranspiration models were calculated. Their sensitivity values were computed by approximating the partial derivatives by finite differences. To compare the models, relative sensitivity was computed as the percent change in evaporation per unit change in the input variable. A second relative sensitivity was calculated to compare the relative importance of the different input variables. Error variance was analyzed to find the variance of error due to instrument inaccuracies using instrument variance estimated from the manufacturer's statements. Although no tests were conducted to determine the bias or prediction accuracy of the model, a technique was proposed to show how the instrument error variance could be added to the prediction error variance to determine the overall system variance. In model development the best model will be one whose sum of these two variances is a minimum if there is no prediction bias.
W77-02298

PATTERNS OF LEAF RESISTANCE TO LODGEPOLE PINE TRANSPIRATION IN WYOMING,
Wyoming Univ., Laramie. Dept. of Botany.
N. Fetcher
Ecology, Vol. 57, No. 2, p 339-345, Early Spring 1976. 4 fig, 27 ref. OWRT A-011-WYO(1). 14-31-0001-3551, 3851, 4051, 5051.

Descriptors: *Conifers, *Stomata, *Transpiration, *Lodgepole pine trees, *Wyoming.
Identifiers: *Leaf resistance, Mountain watersheds, Stomatal behavior, Water potential.

Leaf resistance of lodgepole pine was measured with an aspirated porometer at three sites in the Medicine Bow Mountains, Wyoming. In the early part of the growing season all the sites had low leaf resistance (3-5 s/cm) and few significant changes in leaf resistance during the day. Towards the end of the growing season, in August, significant increases in midday leaf resistance occurred at all sites. The greatest increase (to 57 s/cm) was found on the driest site. Smaller increases (to 10-14 s/cm) were measured at a dry-mesic site and a mesic site. The results indicate that stomatal control of transpiration is more important towards the end of the growing season and that the degree of control varies with the soil water regime of the site. The response to soil water status appears to be nonlinear. When base pressure potential readings were above an upper threshold, leaf resistance did not increase during the day. Below a lower threshold it increased significantly. Between the two thresholds, changes in leaf resistance under high light conditions are explained more readily by the interaction between vapor pressure deficit and soil water status than by either factor alone.
W77-02531

DRIP IRRIGATION INCREASES YIELD AND SIZE OF 'SUNRICH' NECTARINES,
Florida Univ., Gainesville. Dept. of Fruit Crops.
For primary bibliographic entry see Field 3F.
W77-02541

EVAPOTRANSPIRATION MODEL TESTED FOR SOYBEAN AND SORGHUM,
Kansas State Univ., Manhattan. Dept. of Agronomy.
E. T. Kanemasu, L. R. Stone, and W. L. Powers.
Agronomy JOurnal, Vol. 68, No. 4, p 569-572, July-August 1976. 3 fig, 3 tab, 13 ref. OWRT A-056-KAN(3).

Descriptors: *Evapotranspiration, *Sorghum, *Soybeans, *Model studies, Evaporation, Transpiration, Advection, Stomata, Lysimeters, Temperature, Soil moisture, Soil water movement, Solar radiation.
Identifiers: Stomatal resistance, Leaf area index.

Daily evapotranspiration estimated using a new model applied to sorghum and soybeans was within 2 mm of estimates by lysimetric observation. The model employs daily inputs of temperature, solar radiation and leaf area index; outputs include transpiration and evaporation. The model has potential in scheduling irrigation on a routine basis. Seasonal evaporation accounted for 15 to 20% of the evapotranspiration which was about 10% greater from soybeans than from sorghum. Nightime evapotranspiration losses (lysimetric) from soybeans were also 1.8 times greater, indicating lower stomatal resistance. Leaf area indices indicated a greater surface resistance for sorghum. (Jahns-Arizona)
W77-02550

2E. Streamflow and Runoff

A MODEL FOR PREDICTING FLOOD HAZARDS DUE TO SPECIFIC LAND-USE PRACTICES,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W77-02078

AN ANALYSIS OF THE EFFECTS OF PARAMETER UNCERTAINTY IN DETERMINISTIC HYDROLOGIC MODELS,
International Inst. for Applied Systems Analysis, Laxenburg (Austria).
For primary bibliographic entry see Field 2A.
W77-02125

GRID TURBULENCE IN HYDRAULIC MODELS,
Windsor Univ. (Ontario). Dept. of Engineering.
For primary bibliographic entry see Field 8B.
W77-02128

SYNTHETIC DESIGN HYETOGRAPH AND RATIONAL RUNOFF COEFFICIENT,
American Consulting Services, Inc., Minneapolis, Minn. Environmental Engineering.
J-S. Chien, and S. Sarikelle.
Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, Vol. 102, No. IR3, Proceedings Paper 12375, p 307-315, September 1976. 3 fig, 3 tab, 11 ref, 2 append.

Descriptors: *Urban hydrology, *Hydrographs, *Hyetographs, *Rainfall intensity, Rational formula, Runoff coefficient, Urban runoff, Hydrology, Rainfall, Drainage, Time of concentration, Storms.
Identifiers: *Synthetic hyetograph, *Rational runoff coefficient, Average runoff coefficient.

A simple method of establishing the synthetic design hyetograph was presented. The method was based on rainfall intensity-duration-frequency curves with simple computation. The method incorporated the rainfall duration, rainfall depth, and the advancing storm patterns. In addition, a method of computing the average runoff coefficient for the Rational Method was developed. This method was predicated on the principle of mass conservation using Horner's field data. Examples were given for the establishment of synthetic design hyetograph and its application to the determination of average runoff coefficient. The methods presented were useful tools for drainage analysis. (Lee-ISWS)
W77-02135

FLOW RECESSION IN THE EPHEMERAL STREAM,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
R. W. Peebles.
Ph.D. Dissertation, 1975. 88 p, 13 fig, 4 tab, 11 ref.

Descriptors: *Streamflow, *Recession curves, *Ephemeral streams, *Hydraulic models, Model studies, Hydrographs, Discharge(Water), Stage-discharge relations, Streamflow forecasting, Equations, Continuity equation, Reservoir leakage, *Arizona.
Identifiers: *Walnut Gulch Experimental Watershed(Ariz), Pantano Wash(Ariz).

The flow recession portion of the ephemeral stream flood hydrograph is modeled as a conceptual analog of the discharge from a leaky reservoir. This model may be used where flow data is absent and as an operational tool. The reservoir approximates physically the portion of the ephemeral stream channel that is flowing at the start of recession. The reservoir model is described by a continuity equation, a discharge-stage relation (rating) and a storage-stage relation that conveys reservoir shape. A good agreement between observed and model curves is achieved by optimizing reservoir leakage rate and initial storage and is most sensitive to changes in initial storage. Streamflow records used in the study are from the Walnut Gulch Experimental Watershed and Pantano Wash, both in Arizona. The best parameter values are physically realistic; the best reservoir configuration has leakage that varies directly with stage (depth) and storage that varies as the square of the stage. Results suggest that a characteristic shape may exist for recession at a point on the stream (Jahns-Arizona)
W77-02162

MAINE RIVERS BIBLIOGRAPHY- A USER'S MANUAL,
Research Inst. of the Gulf of Maine, Portland.
For primary bibliographic entry see Field 10C.
W77-02224

PROJECT DEVELOPMENT AND DATA PROGRAMS FOR ASSESSING THE QUALITY OF THE WILLAMETTE RIVER, OREGON,
Geological Survey, Portland, Oreg. Water Resources Div.
D. A. Rickert, W. G. Hines, and S. W. McKenzie.
Available from Branch of Distribution, USGS, 1200 S. Eads St., Arlington, Va., 22202. Circular 715-C, 1976. 31 p, 7 fig, 3 tab, 43 ref.

Descriptors: *Water quality, *Project planning, *Rivers, *Oregon, Evaluation, Methodology, Water quality control, Model studies, Land development, Environmental effects, Water pollution sources, Trace elements, Bottom sediments, Algae, Dissolved oxygen, Erosion.
Identifiers: *Willamette River(Oreg).

The U. S. Geological Survey recently (1976) completed an intensive river-quality assessment in the Willamette River basin, Oregon. This circular covers aspects of overall project development and methods and data programs used to assess four river-quality problems. The assessed problems were (1) the effect of population and industrial growth and resulting waste discharges on dissolved oxygen, (2) the potentially harmful effects on land and river quality of accelerated erosion resulting from intensified land use, (3) the potential for nuisance algal growths, and (4) the possibility of trace-metal accumulation in river-bottom sediments. Described are the approaches and rationales used to organize the project, to select and formulate the assessment methods, and to design the data programs. (Woodard-USGS)
W77-02301

SELECTION OF STREAMFLOW AND RESERVOIR-RELEASE MODELS FOR RIVER-QUALTIY ASSESSMENT,
Geological Survey, Jackson, Miss.; and Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 2A.
W77-02302

EFFECTS OF WATER-MANAGEMENT PRACTICES ON THE FLOW OF THE SOUTH PLATTE RIVER, COLORADO,
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-02303

SIMULATED EFFECTS OF THE PROPOSED TENNESSEE COLONY RESERVOIR ON GROUND-WATER CONDITIONS IN THE CARRIZO-WILCOX AQUIFER AND TRINITY RIVER ALLUVIUM, TEXAS,
Geological Survey, Austin, Tex. Water Resources Div.
For primary bibliographic entry see Field 4A.
W77-02305

SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70: PART 1. NORTH ATLANTIC SLOPE BASINS--VOLUME 3. BASINS FROM MARYLAND TO YORK RIVER.
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-02307

TRANSVERSE MIXING IN NATURAL CHANNELS,
Geological Survey, Reston, Va. Water Resources Div.
N. Yoksukura, and W. W. Sayre.
Water Resources Research, Vol 12, No 4, p 695-704, August 1976. 8 fig, 25 ref.

Descriptors: *Diffusion, *Solutes, *Natural streams, *Steady flow, *Mathematical models, Forecasting, Water quality, Equations, Natural flow, Channel flow, *Mixing, Meanders, Evaluation, Data collections.
Identifiers: *Transverse mixing.

A mathematical model is presented for predicting the steady state two-dimensional distribution of solute concentration in a meandering nonuniform natural channel. Two features of the convection-diffusion (mixing) equation derived are that it employs the transverse cumulative discharge as an independent variable replacing the transverse distance and that it is developed in an orthogonal curvilinear (natural) coordinate system which follows the general direction of the channel flow. The transformed mixing equation unifies and generalizes essential concepts of several existing models which have been used successfully for simulating steady state transverse mixing in irregular natural channels. Solution methods, both analytical and numerical, and parameter estimation methods are presented. Results of simulation are compared with observed data. (Woodard-USGS)
W77-02313

COMPARISON OF LINEAR SYSTEMS AND FINITE DIFFERENCE FLOW-ROUTING TECHNIQUES,
Geological Survey, Jackson, Miss. Water Resources Div.
T. N. Keefer.
Water Resources Research, Vol 12, No 5, p 997-1006, October 1976. 10 fig, 13 ref.

Descriptors: *Streamflow forecasting, *Model studies, *Flow characteristics, Routing, *Finite element analysis, Evaluation, *Linear programming, Systems analysis.

Identifiers: Streamflow model comparison, *Finite difference method.

A single-input linear system model and a multiple-input linear system model are compared to a finite difference model. Comparisons are based on the ability of the models to predict discharge at the downstream end of a 24.14-km reach of prismatic channel. Four types of channels and two slopes covering a wide range of conditions are evaluated. The single-input model compares favorably in cases where flood wave celerity does not vary greatly with discharge. The multiple-input model can be made to compare favorably in all cases. Linear model parameters cannot be set accurately without calibration, except in the case of rectangular channels. The single-input model is approximately one sixth as costly as the finite difference model, and the multiple-input model is approximately one half as costly for the conditions investigated. (Woodard-USGS)
W77-02319

MARYLAND HIGHWAY DRAINAGE STUDY: VOLUME I - SUMMARY REPORT,
Maryland Univ., College Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4C.
W77-02490

MARYLAND HIGHWAY DRAINAGE STUDY: VOLUME II - A COMPARISON OF MARYLAND HIGHWAY DRAINAGE PRACTICES WITH THOSE OF OTHER AGENCIES,
Maryland Univ., College Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4C.
W77-02491

MARYLAND HIGHWAY DRAINAGE STUDY: VOLUME III - A LINKED SYSTEM MODEL FOR THE SYNTHESIS OF HYDROGRAPHS IN URBAN AREAS,
Maryland Univ., College Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4C.
W77-02492

MARYLAND HIGHWAY DRAINAGE STUDY: VOLUME VI - AN EXPERIMENTAL EXAMINATION OF THE SUBSURFACE DRAINAGE OF ROADWAYS,
Maryland Univ., College Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4C.
W77-02493

2F. Groundwater

GEOPHYSICAL STUDY OF THE WATERBEARING STRATA IN BITTERROOT VALLEY, MONTANA,
Montana Univ., Missoula. Dept of Geology.
G. W. Crosby.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 390, Price codes: A05 in paper copy, A01 in microfiche. Montana University Joint Water Resources Research Center, Bozeman, Report No. 80, September 1976. 68 p, 23 fig, 3 tab, 52 ref. OWRT A-063-MONT(1). OWRT 14-31-0001-4026.

Descriptors: *Hydrogeology, *Groundwater resources, Magnetic studies, Seismic studies, *Subsurface mapping, *Montana, Model studies.
Identifiers: *Bitterroot Valley(Mont), *Bouguer anomaly, Ambrose Creek area(Mont).

A map of the complete Bouguer anomaly for the Bitterroot Valley in Western Montana is produced and interpreted to yield the general geometry of Cenozoic valley fill sediments. Various steps in processing the gravity data are discussed including lowpass, frequency domain filtering and two and three dimensional modeling. Refraction and reflection seismic data are analyzed for the area north of Stevensville to verify the models generated from the gravity data and to investigate the possibility of using seismic methods to gain meaningful data for ground water prospecting. A map of the total magnetic intensity is presented for the area north of Stevensville. Depth estimates based upon the magnetic data indicate anomalies originating from several levels in the subsurface in the vicinity of Ambrose Creek. Three dimensional modeling of the magnetic field verified the existence of a multilayer anomalous body. Results indicate the existence of a continuous surface which extends from the eastern face of the Bitterroot Range and intersects the anomalous magnetic body in the Ambrose Creek area. (Stuart-Montana State)
W77-02085

INVESTIGATION OF TWO-REGIME WELL FLOW,
University Coll. of Swansea (Wales).
For primary bibliographic entry see Field 4B.
W77-02142

NUMERICAL SOLUTION OF BOUSSINESQ EQUATION,
Punjab Agricultural University, Ludhiana (India). Dept. of Soil and Water Engineering
S. R. Singh, and C. M. Jacob.
Journal of the Engineering Mechanics Division, American Society of Civil Engineers, Vol. 102, No. EM5, Proceedings Paper 12463, p 807-824, October 1976. 4 fig, 24 ref, 2 append

Descriptors: *Aquifers, *Groundwater, *Mathematical models, *Numerical analysis, Water resources, Analytical techniques, Seepage, Hydrology, Equations, Model studies, Flow
Identifiers: *Boussinesq equation, Travel waves, Crank-Nicolson finite difference scheme, Phreatic aquifer.

The Boussinesq equation is a mathematical model of unconfined groundwater flow. Since the equation is nonlinear, finite difference methods offer a possible technique for solutions. In this study, an extrapolated Crank-Nicolson finite difference scheme for one-dimensional Boussinesq equation with source and sink terms was described to model the flow through a phreatic aquifer lying between two open channels. Generalized traveling wave solutions of the same equation were also obtained A comparison of the extrapolated Crank-Nicolson solution with a traveling wave solution confirmed the accuracy of the former. Details of the response of an unconfined aquifer subject to different rates of recharge and withdrawal were presented. (Lee-ISWS)
W77-02143

PREDICTION OF MOUND GEOMETRY UNDER RECHARGE BASINS,
San Jose State Univ., Calif.
R. Singh.
Water Resources Research, Vol. 12, No. 4, p 775-780, August 1976. 8 fig, 17 ref. NSF GK-18526.

Descriptors: *Groundwater recharge, *Unsteady flow, *Laplaces equation, Recharge, Mathematical studies, Water table, Porous media, Dimensional analysis, Analysis, Computers, Groundwater, Graphical analysis, Equations.
Identifiers: *Finite difference analysis, Boundary conditions.

Design of recharge facilities close to urban centers requires determination of the transient water table in the vicinity of the recharge site. This involves solution of the Laplace equation subject to appropriate boundary and initial conditions which are nonlinear and extremely complex for a phreatic surface with or without accretion. Previous solutions have been obtained either by linearization of the phreatic surface conditions or by utilization of other simplifying assumptions. These solutions are usually inapplicable in regions with steep hydraulic gradients. A technique for computing the transient location of the water table under finite width longitudinal and circular recharge basins was developed. The technique avoided limiting assumptions and linearization. The computations were carried out on a digital computer. Results were presented graphically and compared with other solutions where appropriate. (Adams-ISWS)
W77-02144

THE DETERMINATION OF SEASONAL VARIATIONS IN GROUNDWATER RECHARGE BY DEUTERIUM AND OXYGEN-18 ANALYSIS FOR THE TUCSON BASIN, ARIZONA,
Arizona Univ., Tucson. Dept. of Geosciences.
R. S. White
Master of Science Thesis, 1976. 45 p, 10 fig, 4 tab, 40 ref, 2 append

Descriptors: *Isotope studies, *Deuterium, *Groundwater recharge, *Water management(Applied), *Oxygen isotopes, Recharge, Aquifers, Seepage, Natural recharge, Subsurface waters, Water shortage, Precipitation(Atmospheric), Rainfall, *Arizona, Semiarid climates, Seasonal.
Identifiers: *Tucson Basin(Ariz)

A study was conducted to develop a method for determining the source of groundwater recharge in the Tucson Basin, in southern Arizona. Once these source areas have been defined, isotopic analysis of the water now in storage can help determine whether winter or summer precipitation is more important toward recharge, thus facilitating water management. Paths of recharge were traced by using oxygen-18 and deuterium. It was found that deuterium and oxygen-18 have a distinct differentiation between summer and winter sequences of rain, with the summer precipitation being enriched in deuterium and oxygen-18, due mostly to evaporation fractionation. This distinctive characteristic of the precipitation should help make the identification of recharge areas and recharge paths throughout the basin possible (Jamail-Arizona)
W77-02169

HYDROGEOLOGIC CHARACTERISTICS OF THE MISSOURI RIVER VALLEY FLOOD PLAIN,
Missouri Univ., Columbia. Dept. of Geology.
J. M. Sharp, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 355, Price codes: A04 in paper copy, A01 in microfiche Missouri Water Resources Research Center, Columbia, Completion Report, October 1, 1976. 60 p, 25 fig, 2 tab, 21 ref. OWRT A-085-MO(1), 14-34-0001-6026.

Descriptors: *Missouri River, *Flood plains, *Alluvial aquifers, Mathematical models, Bank storage, *Hydrogeology, Groundwater, Model studies, Water levels.
Identifiers: Lower Missouri River Valley

A combination study of field investigation, yearlong monitoring of river stage and ground-water conditions, and mathematical modelling provided insights into the unexpected variability of floodplain hydrogeology. The ground-water system reflects a continum of change rather than variations from a steady-state condition. Factors controlling ground-water levels are: distance from the river, time since any change in river stage, the geometry of river meanders and valley walls, inhomogeneities in top stratum materials, position of tributary creeks and whether these creeks are influent or effluent, long-term ground-water levels

near valley walls, and pumping. It was possible to separate the flood-plain study area into four types of ground-water response: areas of continuing ground-water high, areas of predominantly down valley flow, areas of slow ground-water response, and areas of rapidly fluctuating ground-water levels. River-ground water interactions were found to be predominantly effluent, predominantly influent, or alternating influent-effluent. Examination of field data cast serious doubts on the validity of common bank-storage model assumptions. Major alluvial aquifers are inhomogeneous and may be confined and/or unconfined. Furthermore, the Dupuit-Forcheimer conditions are not valid nor is the assumption of fully penetrating streams. The lower Missouri River Valley alluvium represents a major, but relatively little used aquifer.
W77-02194

DESCRIPTIONS AND CHEMICAL ANALYSES FOR SELECTED WELLS IN THE CENTRAL SACRAMENTO VALLEY, CALIFORNIA,
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 2K.
W77-02299

STATUS OF GROUND-WATER MODELING IN THE U.S. GEOLOGICAL SURVEY,
Geological Survey, Reston, Va. Water Resources Div.
C. A. Appel, and J. D. Bredehoeft.
Available from the Branch of Distribution, USGS, 1200 S. Eads St., Arlington, Va., 22202. Circular 737, 1976. 9 p, 1 tab, 93 ref.

Descriptors: *Groundwater, *Model studies, *Research and development, *Hydrogeology, *Aquifer characteristics, Groundwater movement, Land subsidence, Surface-groundwater relationships, Water pollution sources, Path of pollutants, Geothermal studies, Economic feasibility.
Identifiers: *Groundwater modeling.

The U.S. Geological Survey is active in the development and use of models for the analysis of various types of ground-water problems. Types of problems for which models have been, or are being, developed include: (1) ground-water flow in saturated or partially unsaturated materials, (2) land subsidence resulting from ground-water extraction, (3) flow in coupled ground water-stream systems, (4) coupling of rainfall-runoff basin models with soil moisture accounting and aquifer flow models, (5) interaction of economic and hydrologic considerations, (6) predicting the transport of contaminants in an aquifer, and (7) estimating the effects of proposed development schemes for geothermal systems. The status of modeling activity for various models is reported as being in a developmental, verification, operational, or continued improvement phase. Recently published references that provide useful details on the characteristics of the models are identified. (Woodard-USGS)
W77-02300

POTENTIAL FOR DEVELOPMENT OF GROUND WATER AT A TEST SITE NEAR TRURO, MASSACHUSETTS,
Geological Survey, Boston, Mass. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-02306

THE MERIDIAN-UPPER WILCOX AQUIFER IN MISSISSIPPI,
Geological Survey, Jackson, Miss. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-02310

STRATIGRAPHY OF THE PALEOCENE AND LOWER PART OF THE EOCENE IN WESTERN TENNESSEE,
Geological Survey, Nashville, Tenn. Water Resources Div.
W. S. Parks.
Tennessee Department of Conservation, Nashville, Division of Geology, Bulletin 75, p B1-B55, 1975. 34 fig, 1 plate, 2 tab, 67 ref.

Descriptors: *Geologic formations, *Stratigraphy, *Bedrock, *Fluvial sediments, *Tennessee, Hydrogeology, Groundwater, Aggregates, Geologic time, Geologic mapping, Petrology.
Identifiers: Western Tennessee, Paleocene, Eocene.

In 1965 the U.S. Geological Survey, Water Resources Division, in cooperation with the Tennessee Department of Conservation, Division of Geology, began a project to complete the geologic mapping of the outcrop area of the Paleocene and lower part of the Eocene in western Tennessee. The project area includes twenty-eight 7.5-minute quadrangles. The objective of the investigation was to provide detailed maps that would help inventory the mineral resources and to provide geologic information that would augment understanding of the ground-water resources in western Tennessee. The Clayton Formation and Porters Creek Clay (Midway Group) of the Paleocene Series and the Wilcox Formation and the lower part of the Claiborne Formation of the Eocene Series are the bedrock formations. The boundary between the Clayton Formation, the basal Paleocene unit, and the underlying formations of the Upper Cretaceous Series is within a sequence of similar sediments in most of western Tennessee. The fluvial deposits and alluvium make up surficial deposits, which cover the bedrock formations in extensive areas. Most of these deposits, which consist of sand, gravel, silt, and clay, are a part of the Pleistocene and Holocene Series, but some of the high-level fluvial deposits may be a part of the Pliocene Series. (Woodard-USGS)
W77-02315

GROUND-WATER RESOURCES AND GEOLOGY OF ST. CROIX COUNTY, WISCONSIN,
Geological Survey, Madison, Wis. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-02321

GROUND-WATER HYDROLOGY OF THE COCOA WELL-FIELD AREA, ORANGE COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-02323

ON THE SPECIES TRANSPORT EQUATION FOR FLOW IN POROUS MEDIA,
Systems, Science, and Software, La Jolla, Calif.
T. R. Blake, and S. K. Garg.
Water Resources Research, Vol. 12, No. 4, p 748-750, August 1976. 7 ref. NSF/RANN GI-44212.

Descriptors: *Porous media, *Continuity equation, *Theoretical analysis, Diffusion, Mixing, Equations, Analysis, Fluid mechanics, Momentum equation, Flow, Convection, Solutes.
Identifiers: *Mass transport, *Convective diffusion equation.

A derivation of the species transport equation for flow through porous media was presented. In this study, which was based on the space-averaging formalism developed by Anderson and Jackson, the effects of both flow field fluctuations and tortuosity as well as the influence of solute transport at the fluid-solid interfacial boundary were examined. (Adams-ISWS)
W77-02452

TRANSPORT OF MASS AND ENERGY IN POROUS MEDIA DUE TO NATURAL CONVECTION--THE GEOTHERMAL BASIN PROBLEM,
Colorado Univ., Boulder. Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 4B.
W77-02507

DRAINAGE OF VERTICAL COLUMNS OF LAKELAND SAND,
Florida Univ., Gainesville. Dept. of Soil Science.
For primary bibliographic entry see Field 2G.
W77-02510

DETECTION OF SUBSURFACE SOLUTION CAVITIES IN FLORIDA USING ELECTRICAL RESISTIVITY MEASUREMENTS,
Florida Univ., Gainesville. Dept. of Geology.
D. L. Smith, and A. F. Randazzo.
Southeastern Geology, Vol 16, No 4, p 227-240, May, 1975. 8 fig, 3 tab, 17 ref. OWRT A-025-FLA(1). 14-31-0001-5009.

Descriptors: *Groundwater movement, *Porosity, *Permeability, *Florida, *Resistivity, Measurement, Water level, Karst, Subsurface flow.

Preliminary electrical resistivity investigations in a low-relief karst terrain with a shallow water table provide a simple and inexpensive technique to identify possible water-filled solution cavities at shallow (0-50 feet) depths. Values from profiling and sounding measurements employing the Wenner electrode arrangement in Citrus County, Florida, were interpreted as indicative of solution cavities at a depth of 38 feet at one site and 20 feet at another. A shallow drilling program at the sites encountered solution voids at these depths, substantiating the effectiveness of the method. In addition, the measurements suggest lateral extent of the subsurface cavities and demonstrate a valuable auxiliary tool for the planning of drilling programs to detect subsurface cavities. (Morgan-Florida)
W77-02517

SEDIMENTOLOGY AND PALEOECOLOGY OF MIDDLE AND UPPER EOCENE CARBONATE SHORELINE SEQUENCES, CRYSTAL RIVER, FLORIDA, U.S.A.,
Florida Univ., Gainesville. Dept. of Geology.
A. F. Randazzo, and H. C. Saroop.
Sedimentary Geology, 15, p 259-291, 1976. 12 fig, 2 tab, 65 ref. OWRT A-025-FLA(2). 14-31-0001-5009.

Descriptors: *Groundwater movement, *Porosity, *Permeability, *Sedimentology, *Florida, *Petrography, Petrology, Diagenesis, Lithification, Carbonates.
Identifiers: *Crystal River(Fla), *Lithofacies.

Petrographic analyses of six cores penetrating the Inglis and Avon Park Formations, from Crystal River, Florida, reveal a general regressive-transgressive cycle, aerial exposure and diagenesis. Three distinct lithofacies are represented: (I) biomicrite-poorly washed biosparite; (II) dolomitized biopelmicrite-biosparite and algal dololithite; and (III) pellet and intraclast-bearing biosparite. These lithofacies were deposited under shallow-marine conditions, at times even above the strand line. Lithofacies I was deposited in a shallow basin partly covered by marine grasses and dasyclad algae. Lithofacies II was deposited in the supratidal and intertidal zones and closely resembles the sedimentary characteristics of Holocene mud-flat deposits. Lithofacies III is the shallow-marine counterpart of the supratidal dolostone of lithofacies II and can be compared with a Holocene bank environment. This study illustrates the importance of Holocene analogues in determining and interpreting environments and demonstrates the need to consider sedimentary processes, both physical and biological, which operate in these zones. (Morgan-Florida)
W77-02545

2G. Water In Soils

MAXIMIZING STOMATAL CONTROL AND ROOT SYSTEM TO OPTIMIZE WATER-USE EFFICIENCY IN SOYBEANS,
Kansas Water Resources Research Inst., Manhattan.
For primary bibliographic entry see Field 3F.
W77-02077

SEPTIC TANK EFFLUENT MOVEMENT THROUGH SOIL,
Maine Univ. at Orono. Dept. of Soil Chemistry.
For primary bibliographic entry see Field 5B.
W77-02087

THE USE OF A SPECIFIC ION ELECTRODE FOR DETERMINATION OF BROMIDE IN SOILS,
Texas Engineering Experiment Station, College Station.
A. B. Onken, R. S. Hargrove, C. W. Wendt, and O. C. Wilke.
Soil Science Society of America Proceedings, Vol. 39, No. 6, p 1223-1225, November-December 1975. 3 tab, 9 ref.

Descriptors: *Bromides, *Electrodes, *Tracers, Soil tests, Soil investigations, Chloride, Anions, *Soil analysis, Water analysis, Pollutant identification, *Soil chemistry.

Bromide has desirable characteristics for use as a tracer for NO3- in some soil studies. However, its quantitative determination in the presence of Cl-, which occurs in interfering quantities in many soils, requires lengthy procedures. Further, Br- interferes with the quantitative determination of Cl- for which concentrations may also need to be determined. To facilitate the use of Br- as a tracer in such tests, a procedure for the rapid and accurate determination of water-extractable Br- in the presence of Cl- and Cl- in the presence of Br- was developed. These quantitative determinations over a wide range of concentrations were accomplished by use of standard curves, interference curves, and successive approximations. Bromide added to soil over a wide range of concentrations was quantitatively recovered. (Skogerboe-Colo St)
W77-02100

EFFECTS OF PHOSPHORUS ON SOME PHYSICAL AND CHEMICAL PROPERTIES OF CLAYS,
West Pakistan Agricultural Univ., Lyallpur.
J. F. Lutz, and I. Hague.
Soil Science Society of America Proceedings, Vol. 39, No. 1, p 33-36, January-February 1975. 2 fig, 5 tab, 17 ref.

Descriptors: *Clays, *Phosphorus, Soils, Soil investigations, Soil chemistry, *Soil physical properties, Soil chemical properties, Phosphates, Clay minerals, Montmorillonite, Kaolinite, Hydration, Zeta potential, Hydrogen ion concentration, Soil treatment.

Montmorillonite, kaolinite, and a 1:1 mixture of them were treated with phosphorus at rates as high as 1,600 ppm using phosphoric acid and monocalcium phosphate. After 3 months the clays were examined for pH, zeta potential (charge), swelling, hydration in suspension, modulus of rupture of briquets, and water retention at 5 and 15 bars pressure. (Skogerboe-Colo St)
W77-02101

SULFUR FRACTIONS AND CARBON-NITROGEN-PHOSPHORUS-SULFUR RELATIONSHIPS IN SOME BRAZILIAN AND IOWA SOILS,
Iowa State Univ., Ames.
A. M. L. Neptune, M. A. Tabatabai, and J. J. Hanway.
Soil Science Society of America Proceedings, Vol 39, No 1, p 51-55, January-February 1975. 5 tab, 28 ref.

Descriptors: *Sulfur, Soils, Soil properties, Soil tests, Iowa, *Carbon, *Nitrogen, *Phosphorus, South America.
Identifiers: *Brazilian soils, *Iowa soils.

Current knowledge concerning the percentage distribution of the various S fractions in soils is mainly derived from studies of S in surface soils of temperate regions. This study was conducted to determine the S fractions and C-N-P-S relationships in some subtropical soils from Brazil and to compare the values in these soils with those in soils of a temperate region from Iowa. (Skogerboe-Colo St)
W77-02102

VEGETATION AND SOIL OF SALINE DEPRESSIONS NEAR NAJAF, CENTRAL IRAQ,
Baghdad Univ., (Iraq). Dept. of Botany
For primary bibliographic entry see Field 3C.
W77-02116

RELATIVE IMPORTANCE OF SOIL RESISTANCE AND PLANT RESISTANCE IN ROOT WATER ABSORPTION,
Agricultural Research Service, Florence, S. C. Southern Region
For primary bibliographic entry see Field 2D
W77-02118

EXPERTS CLING TO WATER MYTHS,
For primary bibliographic entry see Field 3F
W77-02120

SCOURING OF COHESIVE SOILS,
Howard Univ., Washington, D. C. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W77-02127

SEEPAGE FROM TRAPEZOIDAL CANAL IN ANISOTROPIC SOIL,
Indian Inst. of Science, Bangalore. Dept. of Civil Engineering.
A. S. Reddy, and U. Basu
Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, Vol. 102, No. IR3, Proceedings Paper 12386, p 349-361, September 1976. 6 fig, 28 ref, 2 append.

Descriptors: *Irrigation, *Seepage, *Canals, Irrigation canals, Permeability, Anisotropy, Homogeneity, Phreatic lines, Hydrology, Hydraulics, Equations, Flow.
Identifiers: *Conformal mapping, Vedernikov's solution.

An analytical solution which takes into account the general anisotropic behavior of the porous medium was found for the problem of seepage flow from an unlined trapezoidal canal. Since a canal in an anisotropic medium transforms into one with unequal slopes in an equivalent isotropic porous medium, the solution here was concerned with the problem of seepage flow from an unsymmetrical trapezoidal canal. The method of inversion of hodograph was made use of, and expressions for the seepage loss and the locations of the phreatic lines were obtained. Numerical results were presented for the equivalent isotropic flow domain. Using the transformation formulas given, the actual discharge and the locations of phreatic lines in anisotropic medium can be easily obtained for given physical parameters of the actual flow domain. The nonsymmetry of trapezoidal canals of side slopes less than one has considerable influence on the quantity of seepage. (Lee-ISWS)
W77-02137

INFLUENCE OF DIFFERENT WATER REGIMES ON OXYGEN DIFFUSION RATES, NUTRIENT UPTAKE, GROWTH AND YIELD OF WHEAT,
Indian Agricultural Research Inst., New Delhi.
For primary bibliographic entry see Field 3F.
W77-02177

TRANSIENT MOVEMENT OF WATER AND SOLUTES IN UNSATURATED SOIL SYSTEMS, PHASE II,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
D. D. Evans, T. W. Sammis, and A. W. Warrick.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 348, Price codes: A03 in paper copy, A01 in microfiche. Completion Report, September 1976. 40 p, 14 fig, 9 tab, 12 ref. OWRT B-040-ARIZ(1), 14-31-0001-4059.

Descriptors: *Unsaturated flow, *Tritium, *Soil water movement, *Arizona, *Solutes, Deep percolation, *Seepage, Methodology, Salts, Aquifers, Water quality, Pollutant identification, Darcys law.
Identifiers: Deep seepage, Temperature profiles, *Phoenix(Ariz)

This project yielded results on the movement of water and solutes from beneath the root zone to a water table aquifer in an irrigated area near Phoenix, Arizona. Three methods were explored for estimating deep seepage rates. They were: (1) measurement of the hydraulic conductivities and gradients and by Darcy's equation calculating the seepage rate; (2) measurement of the temperature profile and calculating the seepage rate from the shape of the profile curve; and (3) measurement of he tritium concentation of the soil water and relating it to the history of the tritium concentration of precipitation. The different methods were used at one site where a deep well was drilled to obtain samples, but the temperature-profile method was tried at other locations. Errors are involved in all of the methods so results differed. At the principal site of study the Darcian velocity estimate (volume of flow per unit area per unit time) ranged from 9 to 38 cm/yr, while the actual velocity estimate (pore velocity) ranged from 57 to 130 cm/yr. The results from other sites indicated an even lower rate of seepage. The solute concentration of the soil water was higher than the aquifer water but, at the one site, the effect of salts in the seepage water should not significantly alter the quality of the aquifer water. (See also W74-01104)
W77-02189

MOVEMENT OF FERTILIZER AND HERBICIDE THROUGH IRRIGATED SANDS,
Florida Univ., Gainesville. Dept. of Soil Science; and Florida Univ., Gainesville. Inst. of Food and Agriculture.
For primary bibliographic entry see Field 5B.
W77-02219

NITROGEN IN THE SOIL WATER OF THE ECOSYSTEM OF THE AMAZONIAN PRAIRIES, (IN PORTUGESE),
Instituto Nacional de Pesquisas da Amazonia Manaus (Brazil).
For primary bibliographic entry see Field 5B.
W77-02239

TRACE ELEMENTS IN SOILS OF THE DNIEPER-BUG LIMAN, (IN UKRANIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
M. A. Truba, and O. P. Nakhshyna.
Dopov Akad Nauk Ukr Rsr Ser B Heol Heofiz Khim Biol 10, p 950-953, 1975.

Descriptors: *Trace elements, *Soil analysis, *Copper, *Manganese, Distribution patterns, Or-

ganic matter, Nitrogen, Carbon, Oxidation-reduction potential, Rivers, River beds.
Identifiers: Dnieper-Bug Rivers(USSR), *Liman soils.

The Cu content of the liman soils was 10(-5) -5.10(-3%) and that of MN 10(-2) -4.10(-1%). The distribution over the bottom was determined by the mechanical composition of the soil and its content of organic matter. Statistical calculations confirmed the close correlation between the content of Cu and Mn and Corg and Norg. An average inverse dependence on the pH value and redox potential of the soil columns was determined for Mn (USSR).--Copyright 1976, Biological Abstracts, Inc.
W77-02258

EXTRACTION-PHOTOMETRIC DETERMINATION OF MERCURY IN SOIL AND WATER, (IN RUSSIAN),
Uzhgorod State Univ. (USSR).
For primary bibliographic entry see Field 5A.
W77-02272

NITROGEN FIXATION BY ALGAE IN FESCUEGRASS SOIL CRUSTS,
Georgia Univ., Athens. Dept. of Agronomy.
G. B. Reddy, and J. Giddens.
Soil Science Society of America Proceedings, Vol. 39, No. 4, p 654-656, July-August 1975. 1 fig, 3 tab, 21 ref.

Descriptors: *Grasses, *Subsoils, *Nitrogen fixation, Nitrogen, Nutrients, Algae, Fertilization, Carbon, Fescues.

Soil crusts and subsoil samples of different ages of tall fescuegrass were collected and analyzed for N, C, and acetylene reduction. Total N and C in the crust was 0.18% and 2.76%, respectively, in 4-year old soil crust as compared to 0.06% and 0.67% respectively, in fallow soil. The amount of acetylene reduction after 5 days' incubation was 13.77 micro-mole/flash (9.6 cm2) for the 4-year-old sod crust compared to 3.06 micro-mole/flask for the fallow control. Ammonium nitrate reduced and liming increased N fixation in the crust. Nitrogen fixation in the crust was highest at 55% shade. Greater nitrogen fixation occurred when moss was present in crust. (Skogerboe-Colo St)
W77-02274

RATE OF DISSOLUTION OF PHOSPHATE FROM MINERALS AND SOILS,
Montana State Univ., Bozeman. Dept. of Chemistry.
R. A. Olsen.
Soil Science Society of America Proceedings, Vol. 39, No. 4, p 634-639, July-August 1975. 9 fig, 2 tab, 18 ref.

Descriptors: *Phosphates, Nutrients, Soil investigations, Laboratory tests, Roots, Minerology, Dispersion, Path of pollutants.

A laboratory technique was devised for conveniently measuring the rate of dissolution of phosphates in minerals and soils. The conditions imposed upon the samples were believed to be similar in several important respects to those in the close proximity of plant roots. An equation was derived which was reasonably descriptive of the dissolution process even in widely different soils. The technique was used to measure the rate of dissolution of a number of well-characterized rock phosphate samples and of may soils. The data were found to rate the samples very well with regard to their value as a source of phosphate to plants. (Skogerboe-Colo St)
W77-02275

THE EFFECT OF AMMONIA AND AMMONIA-SULFUR SOLUTIONS ON NITRIFICATION RATES AND CHEMICAL PROPERTIES OF A CALCAREOUS SOIL,
Texas Tech Univ., Lubbock. Dept. of Agronomy.
R. G. Stevens, and J. O. Reuss.
Soil Science Society of America Proceedings, Vol. 39, No. 4, p 787-793, July-August 1975. 7 fig, 2 tab, 25 ref.

Descriptors: *Nitrification, *Soil chemistry, *Soil chemical properties, *Chemical properties, *Ammonia, Soil properties, Nitrates, Nitrites, Sulfur.
Identifiers: Ammonia-sulfur solutions, Calcereous soils.

Nitrification rates and changes in chemical properties of a calcareous soil were investigated after injection of liquid anhydrous NH3 and anhydrous NH3-S solutions. Nitrification rates (on a whole pot basis) of 15.7, 25.3, and 32.2 mg of N per pot per day were found with the application of 200, 400, and 600 mg of N/pot, respectively. These nitrification rates were recorded during the initial 14 days of the study when total NO3- accumulation appeared to be linear. (Skogerboe-Colo St)
W77-02276

POTASSIUM-CALCIUM EXCHANGE EQUILIBRIA IN VOLCANIC-ASH SOILS,
Chile Univ., Santiago. Dept. of Chemistry.
E. B. Schalscha, P. F. Pratt, and L. Andrade.
Soil Science Society of America Proceedings, Vol. 39, No. 6, p 1069-1072, November-December 1975. 3 fig, 4 tab, 12 ref.

Descriptors: *Potassium, *Calcium, Soils, Soil investigations, Soil chemistry, Chemical reactions, Equilibrium, *Cation exchange, Ion exchange.
Identifiers: *Potassium-calcium exchange equilibria, *Chile(Soils), *Volcanic-ash soils.

Potassium-Ca exchange equilibria were determined at potassium adsorption ratios (PAR) of 0.2, 2.0, and 20 for pH values of 4.8, 6.0, and 7.5 for four volcanic-ash soils of southern Chile. Increases in pH produced large increases in cation exchange capacity (CEC) which were largely balanced by increases in the amount of Ca adsorbed. The increases in exchangeable K with increase in CEC were relatively small. The relative affinities for K versus Ca at a PAR of 0.2 indicated that for each soil a small, but nearly constant, amount of negative charge had a high specificity for K. Beyond this small amount of CEC with a high affinity for K, the affinities for K were relatively low. (Skogerboe-Colo St)
W77-02277

A MODEL FOR THE SIMULTANEOUS PRODUCTION AND DIFFUSION OF FERROUS IRON IN SUBMERGED SOILS,
Agricultural Univ., Wageningen (Netherlands). Dept. of Soils and Fertilizers.
K. Harmsen, and N. Van Breemen.
Soil Science Society of America Proceedings, Vol. 39, No. 6, p 1063-1068, November-December 1975. 4 fig, 19 ref.

Descriptors: *Model studies, *Iron, *Saturated soils, Soil horizons, Soils, Soil investigations, Rice, Diffusion, Path of pollutants, Soil profiles.
Identifiers: Rice paddy soils.

The model describes the distribution of dissolved ferrous iron as a function of time and depth in a flooded soil profile consisting of three distinct horizons. In this soil profile, the production of dissolved ferrous iron is high and constant with depth in the surface horizon, low and constant with depth in the subsoil, and varies linearly with depth between these two values in the intermediate horizon. The Fe2+ concentration is found as the difference of the rate of ferrous iron production, integrated over time and a diffusion term consisting of an infinite series of the third and fifth repeated integral of the complementary error function. The parameters considered are (1) three constants specifying the dependence of the ferrous iron formation on time and depth, (2) the depths of the three horizons, and (3) the apparent diffusion coefficient. As shown by one example, the general solution can be greatly simplified for many cases of practical interest. The inherent assumptions of the model and its application to actual waterlogged soils are discussed. (Skogerboe-Colo St)
W77-02278

INITIAL RELEASE OF NITROGEN FROM UREAFORM UNDER FIELD CONDITIONS,
Agricultural Research Organization, Bet-Dagan (Israel). Inst. of Soils and Water; Agricultural Research Organization, Bet-Dagan (Israel). Div. of Soil Chemistry and Plant Nutrition.
For primary bibliographic entry see Field 3F.
W77-02279

FIXATION OF IRON AND ZINC APPLIED AS CHELATES INTO A SOIL COLUMN DURING LEACHING,
Hebrew Univ., Rehovoth (Israel). Dept. of Soil and Water Science.
N. Lahav, and M. Hochberg.
Soil Science Society of America Proceedings, Vol. 39, No. 6, p 1213-1215, November-December 1975. 4 fig, 3 ref.

Descriptors: *Iron, *Zinc, *Leaching, Infiltration, Soil investigations, Sands, Chelation.
Identifiers: *Soil columns, Breakthrough curves.

The movement of iron in the form of FeEDDHA and FeEDTA and zinc in the form of ZnEDTA was studied in columns of Rehovot sand under several flow rates and in the presence of either Ca(N03)2 or KN03 with the same ionic strength of 0.0375M/liter. Chloride was used as a tracer. FeEDDHA was neither adsorbed nor fixed by the soil. Both ZnEDTA and FeEDTA were fixed in the soil column in the presence of Ca2+ but not in the presence of K+. ZnEDTA was not adsorbed significantly, whereas FeEDTA was adsorbed in the presence of either KN03 or Ca(N03)2 solutions. Reasonable agreement was obtained between experimental results and theoretical calculations of the breakthrough curves, based on the analytical solution of the general dispersion equation. (Skogerboe-Colo St)
W77-02280

CROP PRODUCTION FUNCTION DETERMINATIONS AS INFLUENCED BY IRRIGATION AND NITROGEN FERTILIZATION USING A CONTINUOUS VARIABLE DESIGN,
North Dakota State Univ., Fargo. Dept. of Soil Science and Biometerology.
For primary bibliographic entry see Field 3F.
W77-02281

EFFECT OF LIME ON BORON TRANSPORT TO AND UPTAKE BY COTTON,
Arkansas Univ., Fayetteville. Dept. of Agronomy.
For primary bibliographic entry see Field 3F.
W77-02282

DISSOLUTION OF ILLITE--A POSSIBLE MECHANISM OF POTASSIUM RELEASE,
Agricultural Research Organization, Bet-Dagan (Israel). Inst. of Soils and Water.
S. Feigenbaum, and I. Shainberg.
Soil Science Society of America Proceedings, Vol. 39, No. 5, p 985-990, September-October 1975. 3 fig, 2 tab, 18 ref.

Descriptors: *Potassium, *Aluminum, *Iron, *Magnesium, *Illite, Chemical reations, Diffusion, Soils.

The rate of potassium, aluminum, iron and magnesium release from Fithian illite in dilute salt

solutions and at pH > 3 was studied. Cumulative cation release was proportional to the square root of the duration of the treatment. The rate of Al release was similar to the rate of K release, whereas the rate of Fe and Mg release was about three x that of K and Al release. Since the only known mechanism for the release of the lattice cations is the dissolution of the clay, it is proposed that dissolution of the clay lattice is also the dominant mechanism by which potassium is released from the clay. Two consecutive reactions, a rapid exchange reaction and a slow first-order reaction, explain the experimental observations. (Skogerboe-Colo St)
W77-02283

SOIL CHANGES RESULTING FROM CROPPING,
Agricultural Research Service, Manhattan, Kans.
E. L. Skidmore, W. A. Carstenson, and E. E. Banbury.
Soil Science Society of America Proceedings, Vol. 39, No. 5, p 964-967, September - October 1975. 3 fig, 2 tab, 24 ref.

Descriptors: *Crops, Crop production, *Soil investigations, *Soil properties, Grasses, Pastures, Soil structure, Organic matter, Cultivation.

The need to document further the changes in soil properties from various cropping systems and the uniqueness of a long-time cultivated field adjacent to buffalograss pasture prompted the evaluation of soil-property changes of a Keith silt loam characteristic of that pasture and field. In the fall of 1973, the sod of the buffalograss pasture was broken for analysis. Soil samples were obtained from the pasture (newly broken sod) and the adjacent cultivated field. The wet aggregates from the pasture were stabler as compared with the cultivated field for both flash and vacuum wetting. However, the dry aggregates from the cultivated field were slightly stabler than those from the pasture. (Skogerboe-Colo St)
W77-02284

A THERMODYNAMIC MODEL FOR PREDICTING THE FORMATION, STABILITY, AND WEATHERING OF COMMON SOIL MINERALS,
Batelle-Northwest, Richland, Wash.
D. Rai, and W. L. Lindsay.
Soil Science Society of America Proceedings, Vol. 39, No. 5, p 991-996, September-October 1975. 5 fig, 2 tab, 33 ref.

Descriptors: *Model studies, *Weathering, Soils, Soil investigations, Mineralogy.
Identifiers: *Mineral transformations, *Thermodynamic models.

Numerous workers have examined the weathering products of soil minerals and have proposed empirical weathering sequences. Development is described of a thermodynamic model that predicts in a systematic way several mineral transformations that can occur in soils. According to this model, the stability of primary minerals increases in the order: Na-glass, K-glass, pyroxene, analcime, anorthite, low albite, muscovite, microcline, and quartz. The stability of secondary clay minerals depends on soluble silica. At pH 6 with high silica the order of increasing stability is: chlorite, halloysite, gibbsite, illite, dickite, beidellite, kaolinite, and montmorillonite; at low silica the order is: chlorite, halloysite, illite, beidellite, montmorillonite, dickite, kaolinite, and gibbsite. The stability of both primary and secondary minerals increases with pH. (Skogerboe-Colo St)
W77-02285

EFFECT OF DEGREE OF SOIL PROFILE DISRUPTION ON PLANT GROWTH AND SOIL WATER EXTRACTION,
Academy of Agricultural Sciences, Sofia (Bulgaria). Inst. of Soil Science.
K. Rakov, and H. V. Eck.
Soil Science Society of America Proceedings, Vol. 39, No. 4, p 744-746, July-August 1975. 3 fig, 3 tab, 9 ref.

Descriptors: *Soil profiles, *Infiltration, Soil investigations, Soil environment, Soil water, Soil horizons, Permeability.

Modification of slowly permeable soil profiles has been effective in ameliorating undesirable soil conditions. Various methods and depths of modification have been studied but little attention has been given to (1) the degree of disruption necessary to accomplish satisfactory profile modification or (2) the relative merits of topsoil-subsoil mixing and stockpiling and returning topsoil to the surface after profile modification. Seven degrees of profile disruption (clod size distributions in the B22t and mixing of topsoil with that horizon) were studied in simulated soil profiles in the greenhouse. Grain sorghum was grown on Pullman clay loam. Disturbance of the B22t layer increased yields but once that layer was disturbed, degree of disturbance had no further effect on yield. Compared with retaining topsoil on the surface, mixing it with the B22t did not affect yields. (Skogerboe-Colo St)
W77-02286

INTERACTIONS OF MICRONUTRIENTS IN BARLEY GROWN ON ZINC-POLLUTED SOILS,
Himachal Pradesh Univ., Palampur (India).
B. R. Singh, and K. Steenberg.
Soil Science Society of America Proceedings, Vol. 39, No. 4, p 674-679, July-August 1975. 2 fig, 7 tab, 41 ref.

Descriptors: *Nutrients, *Barley, *Zinc, Soil tests, Soil investigations, Crop response, Water pollution sources.
Identifiers: *Micronutrients.

Barley grown in zinc-polluted soils with variable levels of Zn, Mn, and Fe showed no marked differences in the yield attributable to these variables in both soils investigated. However, in direct contrast to results reported by other investigators, concentrations of 65Zn and total zinc were found to increase with increased levels of added Mn and/or Fe with few exceptions. Similarly, concentrations of 54Mn and total Mn also increased with increased levels of Zn and/or Fe. The effects of Zn and Mn on the concentrations of 59Fe and total Fe were inconsistent. The concentration of Mo was found to decrease with increased levels of Zn, Mn, and Fe and the decrease was more pronounced in one soil than in the other. (Skogerboe-Colo St)
W77-02287

ENVIRONMENTAL IMPLICATIONS OF N FIXATION BY SOYBEANS,
Illinois Univ. at Urbana-Champaign. Dept. of Agronomy.
For primary bibliographic entry see Field 3C.
W77-02289

NITRATE-NITROGEN REMOVAL FROM SOIL PROFILES BY ALFALFA,
Southwestern Great Plains Research Center, Bushland, Tex.
A. C. Mathers, B. A. Stewart, and B. Blair.
Journal of Environmental Quality, Vol. 4, No. 3, 1975. p 403-405, 3 fig, 3 tab, 12 ref.

Descriptors: *Nitrates, *Nitrogen, *Alfalfa, Crop response, Crop production, Phosphorus, Soil investigations, *Soil profiles, *Farm wastes, *Nutrient removal.
Identifiers: *Nitrate-nitrogen removal.

Alfalfa was established in the fall of 1971 on plots previously treated with 0, 22, 45, 112, or 224 metric tons/ha of manure annually for 3 years. Additional plots had received 224 kg N/ha annually for 3 years. Nitrate-nitrogen and water contents of the soil profile were determined by 30-cm increments to 6 m prior to planting. Nitrate-nitrogen was found to 6 m, but the largest concentrations were in the top 1.8 m, where amounts of NO3(-)-N varied from 100 to 2,400 kg/ha. Additional profile samples were taken in 1972 and 1973 after the final cutting of alfalfa. Alfalfa removed water and NO3(-)-N to a 1.8-m depth the first year and to 3.6 m the second year. These results indicate that alfalfa could remove NO3(-)-N from the lower depth of soil profiles where annual crops were not effective. Yield, NO3(-)-N, and P contents of alfalfa were increased by manure. Total N taken up by the crop was directly related to the yield. (Skogerboe-Colo St)
W77-02290

A COMPARISON OF NITROGEN, PHOSPHORUS, AND CARBON IN SEDIMENTS AND SOILS OF CULTIVATED AND NONCULTIVATED WATERSHEDS IN THE NORTH CENTRAL STATES,
Agricultural Research Service, Oxford Miss.
For primary bibliographic entry see Field 5G.
W77-02292

NITROGEN LOSSES FROM SOILS OF THE NORTH CAROLINA COASTAL PLAIN,
North Carolina State Univ., Raleigh. Dept. of Soil Science.
For primary bibliographic entry see Field 5B.
W77-02294

SIMULATION OF ROOT-ZONE WATER AND DEEP SEEPAGE TO A WATER TABLE,
Connell/Metcalf and Eddy, Coral Gables, Fla.
T. G. King, and J. R. Lambert.
Presented at the 1975 Winter Meeting of the American Society of Agricultural Engineers, December 15-18, 1975, Chicago, Illinois, 12 p. 5 fig, 2 ref.

Descriptors: *Model studies, *Root zone, Moisture tension, Soil water, *Soil water movement, *Seepage, *Water table, Evapotranspiration, *Computer models, Simulation analysis.

The primary objective was to develop a computer model that would simulate the quantity and movement of water in the deep seepage region, i.e., between the root zone and the water table. Effort was also directed towards simulating evapotranspiration and the movement of the water table. The model has been structured so that it may readily be modified to other locations where basic meteorological records and soil data are available. (See also W76-09245) (Skogerboe-Colo St)
W77-02295

POTASSIUM IN AN ARID LOESSIAL SOIL: CHARACTERIZATION BY EQUILIBRIUM RELEASE-ABSORPTION TO STRONG SALT SOLUTIONS,
Washington State Univ., Pullman. Coll. of Agriculture Research Center.
D. W. James, and W. H. Weaver.
Soil Science Society of America Proceedings, Vol. 39, No. 6, p 1106-111, November-December 1975. 6 fig, 1 tab, 24 ref.

Descriptors: *Potassium, Soil chemistry, Soil investigations, Sodium, Magnesium, Calcium, Absorption, Loam, Silicates.

Shano silt loam soil developed from loessial and volcanic materials of recent origin under mild weathering conditions. It contains less than 5% of clay and 60% or more of silt. The rate of release of mineral K (Km) in this soil to 1N Cl solutions decreased in the order Na greater than Ca greater than Mg much greater than NH4. Release of Km may have involved some framework silicates, but for practical purposes the layer silicates controlled Km activity. (Skogerboe-Colo St)

W77-02296

SOYBEAN YIELD RESPONSES AND ASSIMILATION OF ZN AND CD FROM SEWAGE SLUDGE-AMENDED SOIL,
Illinois Univ. at Urbana-Champaign. Dept. of Agronomy.
For primary bibliographic entry see Field 5C.
W77-02377

MOVEMENT OF HEAVY METALS BELOW SEWAGE DISPOSAL PONDS,
California Univ., Riverside. Dept. of Soil Science and Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W77-02379

ENVIRONMENTAL IMPACTS OF LAND APPLICATION OF SLUDGE,
Metropolitan Sanitary District of Greater Chicago, Ill. Dept. of Research and Development.
For primary bibliographic entry see Field 5D.
W77-02391

GAS AND LEACHATE FROM LANDFILLS: FORMATION, COLLECTION, AND TREATMENT. PROCEEDINGS OF A RESEARCH SYMPOSIUM.
Municipal Environmental Research Lab., Cincinnati, Ohio.
For primary bibliographic entry see Field 5E.
W77-02394

THEORETICAL APPROACH TO GAS MOVEMENT THROUGH SOILS,
Ohio State Univ., Columbus. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W77-02401

LEACHATE ATTENUATION IN UNDISTURBED AND REMOULDED SOILS,
Waterloo Univ. (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W77-02403

LEACHATE MIGRATION THROUGH SELECTED CLAYS,
Illinois State Geological Society, Urbana.
For primary bibliographic entry see Field 5B.
W77-02406

ATTENUATION MECHANISMS OF POLLUTANTS THROUGH SOILS,
Arizona Univ., Tucson. Coll. of Agriculture.
For primary bibliographic entry see Field 5B.
W77-02408

MONITORING TOXIC CHEMICALS IN LAND DISPOSAL SITES,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 5A.
W77-02409

CASE HISTORY OF LANDFILL GAS MOVEMENT THROUGH SOILS,
Cook Coll., New Brnswick, N. J.
For primary bibliographic entry see Field 5E.
W77-02413

REMOTE SENSING OF SOIL MOISTURE BY A 21-CM PASSIVE RADIOMETER,
Kansas Univ. Lawrence.
J. R. Eagleman, and W. C. Lin.
Journal of Geophysical Research, Vol. 81, No. 21, p 3660-3666, July 20, 1976. 6 fig, 2 tab, 16 ref. NASA NAS-9-13273.

Descriptors: *Remote sensing, *Soil moisture, *Microwaves, Satellites(Artificial), On-site data collections, Regression analysis, Precipitation(Atmospheric), Evaporation, Measurement, Vegetation, Vegetation effects, Temperature, Surveys.
Identifiers: *Skylab, Radiometers, Passive radiometers.

Microwave sensors on Skylab collected data as part of the Earth Resources Experiment Package (EREP). An investigation was designed to obtain field observations of soil moisture content for comparison with data from Skylab. The 21-cm radiometer was shown to be highly responsive to the moisture content of the upper 2.5-cm layer of soil. A composite relationship between the radiometric temperature and soil moisture content was determined from five data sets obtained over Kansas and Texas. This relationship, having a correlation index of -0.96, has been used as a basis for calculating the soil moisture content of large areas across the United States. (Sims-ISWS)
W77-02480

SATELLITE MICROWAVE OBSERVATIONS OF SOIL MOISTURE VARIATIONS,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
T. J. Schmugge, A. Rango, and R. Neff.
Available from the National Technical Information Service, Springfield, VA 22161 as N76-15553, Price Codes: A03 in paper copy, A01 in microfiche. Preprint X-913-75-304, November 1975. 31 p, 10 fig, 2 tab, 5 ref.

Descriptors: *Remote sensing, *Vegetation, *Soil moisture, *Microwaves, Satellites(Artificial), Surveys, Measurement, Precipitation(Atmospheric), Evaporation, Vegetation effects, Soils, Agriculture.
Identifiers: *Microwave brightness temperature, Microwave emission.

The Electrically Scanning Microwave Radiometer (ESMR) on the Nimbus 5 satellite was used to observe microwave emissions from vegetated and soil surfaces over an Illinois-Indiana study area, the Mississippi Valley, and the Great Salt Lake Desert in Utah. Analysis of microwave brightness temperatures (T sub B) and antecedent rainfall over these areas provided a way to monitor variations of near-surface soil moisture. Because vegetation adsorbs microwave emission from the soil at the 1.55 cm wavelength of ESMR, relative soil moisture measurements can be obtained only over bare or sparsely vegetated soil. In general, T sub B increases during rainfree periods as evaporation of water and drying of the surface soil occurs, and drops in T sub B are experienced after significant rainfall events wet the soil. Microwave observations from space are limited to coarse resolutions (10-25 km), but it may be possible in regions with sparse vegetation cover to estimate soil moisture conditions on a watershed or agricultural district basis, particularly since daily observations can be obtained. It was concluded that further applications to agriculture and water resources need to be explored. (Sims-ISWS)
W77-02495

DRAINAGE OF VERTICAL COLUMNS OF LAKELAND SAND,
Florida Univ., Gainesville. Dept. of Soil Science.
G. K. Saxena, R. S. Mansell, and C. C. Hortenstine.
Soil Science, Vol. 120, No. 1, p 1-12, July 1975. 10 fig, 13 ref. OWRT A-026-FLA(4). BOM G0190838 (SWD-24).

Descriptors: *Drainage, *Sands, *Soil water, *Florida, Clays, Percolation, Retention, Stratification, Hydraulic conductivity, Columns, Hydraulic gradient, Infiltration, Root zone, Unsaturated flow, Phosphates, Velocity, Laboratory tests, Sieve analysis, Bulk density, Tensiometers, Discharge(Water).
Identifiers: *Lakeland sand, Phosphatic clay, Suction head, Time-dependence, Trickle irrigation.

A drainage experiment was conducted to determine the time-dependence of soil-water retention during drainage of a quasi-uniform column of Lakeland sand and similar columns to which phosphatic clay was added as an amendment or layer. Phosphatic clay was observed to increase and prolong water retention in the soil. Saturated hydraulic conductivity of the column with soil amended with 5% phosphatic clay in the surface 30 cm was 13 cm/hr, as compared to 25 cm/hr for the quasi-uniform column of Lakeland sand. Drainage from the columns with 1-cm-thick and 2-cm-thick layers of phosphatic clay aggregates was greatly restricted. The nonaggregated phosphatic clay layer provided nearly constant impedence to flow across the layer, whereas successive water desaturation of the larger pores in the layer aggregates resulted in a time-dependent impedence to water flow. At saturation the hydraulic conductivities of the aggregated and nonaggregated clay layers were calculated to be 5.0 and 0.8 cm/hr, respectively. Maximum hydraulic head gradients across the aggregated and nonaggregated clay layers were 4 and 13, respectively. Values of unsaturated hydraulic conductivity calculated from soil-water characteristic curves for the Lakeland sand and measured water-saturated hydraulic conductivity were in good agreement with values measured experimentally from the soil columns. (Visocky-ISWS)
W77-02510

NUTRIENT DISTRIBUTIONS IN A SPODOSOL DURING CORN GROWTH,
Florida Univ., Gainesville. Dept. of Soil Science.
For primary bibliographic entry see Field 5B.
W77-02516

SOIL WARMING WITH POWER PLANT WASTE HEAT IN GREENHOUSES,
Oregon State Univ., Corvallis. Dept. of Soil Science.
For primary bibliographic entry see Field 5G.
W77-02526

MODELING REACTIONS AND TRANSPORT OF POTASSIUM IN SOILS,
Florida Univ., Gainesville. Dept. of Soil Science.
For primary bibliographic entry see Field 5B.
W77-02529

CALCIUM EQUILIBRIUM IN MIXED ION AQUEOUS SYSTEMS OPEN TO THE ATMOSPHERE,
New Mexico State Univ., Las Cruces. Dept. of Agronomy.
For primary bibliographic entry see Field 2K.
W77-02538

DISTRIBUTIONS OF 2,4-D AND WATER IN SOIL DURING INFILTRATION AND REDISTRIBUTION,
Florida Univ., Gainesville. Dept. of Soil Science.
For primary bibliographic entry see Field 5B.
W77-02542

2H. Lakes

IDENTIFICATION AND QUANTIFICATION OF WATER QUALITY CHANGE INDUCTING MECHANISMS IN STRATIFIED RESERVOIRS,
Tennessee Technological Univ., Cookeville. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5C.
W77-02089

U. OF I. URBANA-CHAMPAIGN

SEDIMENTATION RATES AND SEDIMENT THICKNESSES IN LAKE CHAMPLAIN: 1975-76,
Vermont Univ., Burlington. Dept. of Geology.
For primary bibliographic entry see Field 2J.
W77-02193

EAGLE LAKE POLLUTION CONTROL PROJECT, EAGLE LAKE KANDIYOHI COUNTY, MINNESOTA, BENCH MARK STUDIES,
Minnesota Univ., Minneapolis. Water Resources Research Center.
For primary bibliographic entry see Field 5G.
W77-02215

GEOLOGIC AND PHYSICAL FACTORS AFFECTING LAKE CHAMPLAIN SHORELINE EROSION,
Vermont University, Burlington, Dept. of Geology.
For primary bibliographic entry see Field 2J.
W77-02222

EFFECTS ON THE PHOSPHOROUS SITUATION IN LAKE RADASJON ON CHANGES IN THE POLLUTION SITUATION, (IN SWEDISH),
Goteborg Univ. (Sweden). Inst. of Zoology.
For primary bibliographic entry see Field 5C.
W77-02227

EFFECT OF MINE WASTEWATERS ON THE WATER QUALITY OF THE OL'KHOVOYE RESERVOIR, (IN RUSSIAN),
For primary bibliographic entry see Field 5C.
W77-02242

SOME ASPECTS OF THE CHEMICAL COMPOSITION OF TRAPA NATANS L. IN LAKE MAGGIORE (ITALY), ESPECIALLY MANGANESE AND IRON, (IN FRENCH),
European Atomic Energy Community, Ispra (Italy).
For primary bibliographic entry see Field 5C.
W77-02250

PRODUCTION OF PHYTOPLANKTON OF LAKE BAIKAL IN THE REGION OF LISTVENNICHNOYE VILLAGE, (IN RUSSIAN),
Akademiya Nauk SSSR, Leningrad. Zoologicheskii Institut.
For primary bibliographic entry see Field 5C.
W77-02253

CHEMICAL COMPOSITION OF BLUE-GREEN ALGAE IN THE KREMENCHUG RESERVOIR, (IN RUSSIAN),
Tekhnologicheskii Institut Pishchevoi i Kholodilnoi Promyshlennosti, Odessa (USSR).
For primary bibliographic entry see Field 5C.
W77-02254

ELEMENTS OF LIMNOLOGICAL SPECIFICITY OF LARGE LAKES IN THE TEMPERATE ZONE, (IN RUSSIAN),
Akademiya Nauk SSSR, Leningrad. Institut Ozerovedeniya.
I. I. Nikolaev.
Gidrobiol Zh 11(6), p 5-10, 1975.

Descriptors: *Lakes, *Limnology, Algae, Canada, *Oligotrophy, *Photosynthesis, Zooplankton, *Temperate, Great Lakes, United States, Fish, Invertebrates.

The specificity of the nature of large lakes is directly or indirectly dependent on their limnological scale. Oligotrophy of large deep lakes of the temperate zone is determined by small specific mobilization of biogens from the land, their slow regeneration in the water and limited evacuation from deep water to the photosynthetic zone. Certain phenomena in the regime of large lakes make them similar to seas (stability of hydrological, hydrochemical and biological conditions, upwelling, wind surf in the littoral, etc.). Limnological specificity of large lakes is most pronounced in the temperate zone, E.G., Lake Ladoga, Lake Onega, Lake Baikal (USSR), the American Great Lakes (USA, Canada). Algae, zooplankton, invertebrates and fish are discussed.--Copyright 1976, Biological Abstracts, Inc
W77-02260

PREDICTED AND OBSERVED TEMPERATURE AND WATER-QUALITY CHANGES OF LAKES AND RESERVOIRS,
Geological Survey, Lakewood, Colo. Water Resources Div.
D. B. Adams.
Reprint from International Symposium on the Hydrological Characteristics of River Basins and the Effects on these Characteristics of Better Water Management, held in Tokyo, Japan, December 1975: International Association of Hydrological Sciences Publication No. 117, p 873-882, 1975. 15 fig, 9 ref.

Descriptors: *Model studies, *Reservoirs, *Water temperature, *Water quality, Forecasting, Inflow, Solar radiation, Specific conductivity, Discharge(Water), Correlation analysis, Data collections, Evaluation, Environmental effects, Dam design.

The model is a time-dependent, one-dimensional model that describes the temperature and water quality variation in the vertical direction and is based on the absorption and transmission of solar radiation, convection due to surface cooling, and advection due to inflows and outflows. The model was verified by simulation of the thermal and specific conductance distribution of Flaming Gorge Reservoir, Utah-Wyoming, during a 10-month period in 1972. Agreement between predicted and measured temperature profiles are excellent, with differences in localized areas being a maximum of 1.5 deg C. For 1972, maximum predicted discharge temperatures in the stream below the reservoir were 1.3 deg C less than those observed; agreement with time of maximum temperature is excellent. The actual average annual discharge temperature decreased 10 deg C after closing the dam. Specific conductance predictions in the reservoir, based on daily specific conductance inflow data, are very good and show the development of characteristic 'bulges or concavities' observed in the field profiles. This indicates that the solute distribution is indeed controlled by the hydrodynamics of the system. The model provides data useful for evaluating the design of the outlet structure of the proposed dam, the primary concern being to maintain a desired temperature range to control downstream quality and environmental effects. (Woodard-USGS)
W77-02304

SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70: PART 1. NORTH ATLANTIC SLOPE BASINS--VOLUME 3. BASINS FROM MARYLAND TO YORK RIVER.
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-02307

CALORIC INVESTIGATIONS ON THE SHORE COMMUNITY OF A FISH POND, (IN GERMAN),
Bonn Univ. (West Germany). Institut fuer Landwirtschaftliche Zoologie und Bienenkunde.
N. Caspers.
Oecologia (Berl). 19(2), p 171-175, 1975.

Descriptors: *Aquatic microorganisms, *Benthic flora, *Oxidation-reduction potential, *Aerobic conditions, *Variability, Biological communities, Scavengers, Water requirements, Ponds, Shores.
Identifiers: *Macrophytes, Alisma plantago aquatica, Alopecurus aequalis, Bonn, *Caloric content, Equisetum fluviatile, Glyceria fluitans, Juncus effusus, Lycopus europaeus, Lysimachia vulgaris, Mentha aquatica, Myosotis palustris, Polygonum hydropiper, Sparganium erectum, West Germany, *Ash content.

In Aug. 1973 and Aug. 1974, 11 macrophytes (Alisma plantago-aquatica, Alopecurus aequalis, Lycopus europaeus, Polygonum hydropiper, Myosotis palustris, Equisetum fluvatile, Glyceria fluitans, Juncus effusus, Lysimachia vulgaris, Mentha aquatica, Sparganium erectum) of a pond-shore community near Bonn (West Germany) were investigated with regard to caloric values and ash content and the variability of these parameters. Due to the high constancy of the most important factor, 'availability of water', caloric values varied over rather narrow ranges or did not change at all. Mean values of the caloric determinations were obtained (4157.7 and 4161.2 cal/g dry weight; 4601.2 and 4606.1 cal/g ash-free dry weight) and compared with the data provided by other authors. In L. vulgaris L., intraspecific variations of the caloric values were determined according to the combustion of flowers, fruits, leaves, and stems.--Copyright 1975, Biological Abstracts, Inc.
W77-02336

ALGAL METABOLITE INFLUENCE ON BLOOM SEQUENCE IN EUTROPHIED FRESHWATER PONDS,
Haskins Labs., Inc., New Haven, Conn. Orsborn Memorial Lab.
For primary bibliographic entry see Field 5C.
W77-02438

PHOSPHATE REDUCTION AND RESPONSE OF PLANKTON POPULATIONS IN KOOTENAY LAKE,
Washington State Univ., Pullman.
For primary bibliographic entry see Field 5C.
W77-02440

STUDIES ON LAKE RESTORATION BY PHOSPHORUS INACTIVATION,
Corvallis Environmental Research Lab., Oregon.
For primary bibliographic entry see Field 5G.
W77-02442

MATHEMATICAL MODELING OF PHYTOPLANKTON IN LAKE ONTARIO. PART 2. SIMULATIONS USING LAKE 1 MODEL,
Manhattan Coll., Bronx, N. Y. Environmental Engineering and Science Program.
For primary bibliographic entry see Field 5C.
W77-02443

WATER FLOW IN GLACIERS: JOKULHLAUPS, TUNNELS AND VEINS,
Bristol Univ. (England). H. H. Wills Physics Lab.
For primary bibliographic entry see Field 2C.
W77-02458

AUTOMATED SEISMIC MONITORING SYSTEM FOR LAKE MICHIGAN ICE STUDIES,
Wisconsin Univ., Milwaukee. Dept. of Geological Sciences.
For primary bibliographic entry see Field 2C.
W77-02468

LARGE-SCALE CURRENT MEASUREMENTS IN LAKE HURON,
National Oceanic and Atmospheric Administration, Ann Arbor, Mich. Great Lakes Environmental Research Lab.
P. W. Sloss, and J. H. Saylor.
Journal of Geophysical Research, Vol 81, No 18, p 3069-3078, June 20, 1976. 7 fig, 12 ref.

Descriptors: *Water circulation, *Currents(Water), *Lake Huron, *Great Lakes, Current meters, Lakes, Circulation, Measurement, Temperature, Water temperature, Winds, Weather, Flow, Depth, Limnology.
Identifiers: Oscillatory currents.

Reanalysis of the data from the 1966 Great Lakes-Illinois River Basin Project (GLIRBP) of the Federal Water Pollution Control Administration (FWPCA) revealed some of the large-scale persistent summertime circulation patterns in Lake Huron. The greatest density of data from the original 45 current meter moorings covers June-August 1966, when some 21 stations returned synoptically significant data from current meters at depths of 10 and 15 m. From this somewhat sparse sample, it was deduced that at 10-m depth a counterclockwise circulation dominates the northern two thirds of the lake. The shallower southern portion shows a more complex pattern, with generally southward flow along the shorelines on both sides and a return flow northward near the center line of the southern basin. This latter pattern may decay later in the summer, but the data become too patchy for definite analysis. The data set from 15-m depth indicated similar circulations. Spectral analysis of currents at individual stations reveals a strong inertial rotation of the current vector at open lake sites. Only the data from the Straits of Mackinac lack the inertial component and are dominated by the lunar semidiurnal tide and the seiches of Lake Michigan. (Sims-ISWS)
W77-02473

AN EVALUATION OF PARAMETERS FOR THE THEORETICAL DISTRIBUTION OF PERIODS AND AMPLITUDES OF SEA WAVES,
National Oceanic and Atmospheric Administration, Ann Arbor, Mich. Great Lakes Environmental Research Lab.
P. C. Liu.
Journal of Geophysical Research, Vol. 81, No. 18, p 3161-3162, June 20, 1976. 1 fig, 4 ref.

Descriptors: *Waves(Water), *Great Lakes, *Model studies, Mathematical models, Evaluation, Winds, Fetch, Energy, Frequency, Limnology, Equations.
Identifiers: Wave periods, Wave amplitudes.

Parameters used in characterizing the theoretical joint distribution of the periods and amplitudes of sea waves were evaluated in connection with an empirical, fetch-limited wave energy spectrum formula derived from wave data recorded in the Great Lakes. The results showed that the spectral width parameter obtained from the empirical formula justifies the narrow spectrum approximation used in the theoretical distributions. Further empirical data showed that the average wave periods calculated from an energy spectrum are quite close to those estimated from the statistical data. (Sims-ISWS)
W77-02479

SKYLAB STUDY OF WATER QUALITY,
Geological Survey, Lawrence, Kans.
For primary bibliographic entry see Field 5A.
W77-02505

SOME EFFECTS OF THE ASWAN HIGH DAM ON WATER AND FISHES OF LAKE BORULLUS, A. R. E.,
Academy of Scientific Research and Technology, Cairo (Egypt).
For primary bibliographic entry see Field 5C.
W77-02512

SEASONAL VARIATIONS OF TEMPERATURE AND NUTRIENTS IN THE SURFACE WATERS OF LAKES ONTARIO AND ERIE,
Eidgenoessische Anstalt fuer Wasservorsorgung, Abwasserreinigung und Gewaesserschutz, Kastienbaum (Switerzerland). Hydrobiology Lab.
For primary bibliographic entry see Field 5C.
W77-02515

THE EUTROPHICATION IMPLICATIONS OF INTERACTIONS BETWEEN NATURALLY OCCURRING PARTICULATES AND METHANE OXIDIZING BACTERIA,
Ohio State Univ., Columbus. Dept. of Microbiology.
For primary bibliographic entry see Field 5C.
W77-02536

2I. Water In Plants

MAXIMIZING STOMATAL CONTROL AND ROOT SYSTEM TO OPTIMIZE WATER-USE EFFICIENCY IN SOYBEANS,
Kansas Water Resources Research Inst., Manhattan.
For primary bibliographic entry see Field 3F.
W77-02077

VEGETATION AND SOIL OF SALINE DEPRESSIONS NEAR NAJAF, CENTRAL IRAQ,
Baghdad Univ., (Iraq). Dept. of Botany.
For primary bibliographic entry see Field 3C.
W77-02116

WATER FLOW IN WHEAT SEEDLINGS AFTER SMALL WATER DEFICITS,
Lund Univ. (Sweden). Dept. of Plant Physiology.
For primary bibliographic entry see Field 2D.
W77-02172

COMPETITION AND SPACING IN PLANT COMMUNITIES: THE NORTHERN MOHAVE DESERT,
Pennsylvania State Univ., University Park. Dept. of Biology.
R. I. Yeaton, and M. L. Cody.
Journal of Ecology, Vol. 64, No. 2, p 689-696, July, 1976. 4 fig, 7 ref.

Descriptors: *Desert plants, *Plant growth, *Plant groupings, *Competing uses, Water supply, Biological communities, Water requirements, Root systems, Root development, Photosynthesis, Groundwater, Shrubs, Soil moisture, Arid lands, Deserts, Competition.
Identifiers: *Mohave Desert.

The arrangement of individual plants and their inter-relations in complex Mohave desert communities were examined. Three species were studied: Yucca schidigera, Opuntia acanthocarpa, and O. ramosissima. Desert plants compete for water, but are spaced far enough apart to eliminate effects of competition for sunlight. Distance measurements were made in the field, the size of each plant to be studied determined, and the photosynthetic surface area estimated. Results indicate that competition is occuring between the two species of Opuntia and that competition between Yucca and O. acanthocarpa, is as strong as that between the two Opuntia species. O. ramosissima tolerates O. acanthocarpa growing in closer proximity than a member of its own species. This suggests that interspecific differences occur in the structure or function of root systems. The plant community studied is composed of several species, each spaced out on the basis of size. The distribution patterns of each species are superimposed, subject to the following restraints: (1) no two individuals may occupy the same physical trunk space and (2) species which show interspecific competition must be spaced out in relation to the other species with some maximum degree of overlap tolerated. Results also show that it is not necessary to examine plants in pure stands to study competition and spacing. (Jamail-Arizona)
W77-02174

SODIUM RELATIONS IN DESERT PLANTS: 5. CATION BALANCE WHEN GROWN IN SOLUTION CULTURE AND IN THE FIELD IN THREE SPECIES OF LYCIUM FROM THE NORTHERN MOJAVE DESERT,
California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.
For primary bibliographic entry see Field 3C.
W77-02178

BIBLIOGRAPHY OF SOVIET LITERATURE ON FRESHWATER HYDROBIOLOGY AND RELATED PROBLEMS: 1974-1975 (ISSUE 19), (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
A. V. Tropachevskii.
Gidrobiol Zh 11(5), p 126-136, 1975.

Descriptors: *Bibliographies, Algae, *Hydrobiology, Invertebrates, Freshwater, *Microbiology, Parasitism, Toxicity.
Identifiers: USSR.

A bibliography of Soviet works published in 1974-1975 on freshwater hydrobiology, sanitary hydrobiology, aquatic toxicology, physiology of algae, physiology of invertebrates, aquatic microbiology, geochemistry of surface waters and parasitology of freshwater invertebrates is presented.--Copyright 1976, Biological Abstracts, Inc.
W77-02232

PRESSING CHARACTERISTICS OF WATER-HYACINTH,
Florida Univ., Gainesville. Dept. of Agricultural Engineering.
J. Cifuentes, and L. O. Bagnall.
Journal of Aquatic Plant Management, Vol. 14, p 71-75, June, 1976. 8 fig, 1 tab, 11 ref. OWRT A-017-FLA(8). 14-31-0001-3809.

Descriptors: *Drying, Chemical analysis, Nutrients, Digestion, Aquatic weeds, *Water hyacinth, Rooted aquatic plants, Animal physiology, Toxins, Feeds, Aquatic plants, *Aquatic weed control.

Waterhyacinth (Eichhornia crassipes (Mart.) Solms) at 95% moisture content was pressed in cylinders with perforated liners. Parameters affecting radial flow of expressed juices were examined. Particle size reduction, particularly by shearing, and cake rotation within the press increased expression efficiency. Fluid expression decreased as cylinder radius increased and available drainage area decreased. Optimum compression time is about 40 seconds. Cake density is related to material pressure. (Morgan-Florida)
W77-02527

PATTERNS OF LEAF RESISTANCE TO LODGEPOLE PINE TRANSPIRATION IN WYOMING,
Wyoming Univ., Laramie. Dept. of Botany.
For primary bibliographic entry see Field 2D.
W77-02531

2J. Erosion and Sedimentation

A SUBMODEL FOR NITROGEN RELEASE FROM SEDIMENTS,
Copenhagen Univ. (Denmark). Freshwater Biological Lab.
For primary bibliographic entry see Field 5B.
W77-02099

SCOURING OF COHESIVE SOILS,
Howard Univ., Washington, D. C. Dept. of Civil Engineering.
E. O. Kuti, and C-L. Yen.

Journal of Hydraulic Research, Vol. 14, No. 3, p 195-206, 1976. 6 fig, 1 tab, 9 ref.

Descriptors: *Scour, *Cohesive soils, *Laboratory tests, *Void ratio, *Plasticity index, Spillways, Erosion, Chemical properties, Kaolinite, Equilibrium, Model studies, Flow.
Identifiers: *Incipient motion, Equilibrium scour.

The analysis of the scouring problem was approached from the concept of incipient motion of the soil particles. A model spillway was constructed, and experiments were performed on mixtures of sand and clay minerals beyond the hydraulic jump. The general factors affecting scouring of cohesive bed downstream of a spillway were shown to be flow characteristics, soil properties, fluid properties, and boundary conditions. When the rate of flow is finite, there is limit to the extent of scour. The volume of solids, excluding voids, scoured in each soil test at a known percentage of clay mineral was the same irrespective of the in-situ void ratio before scouring was initiated. A low void ratio increases the time to reach the equilibrium scour. As the clay percentage increases, it takes longer to reach the equilibrium stage. The percentage of clay minerals and plasticity index can be used as parameters of soil to give an indication of the resistance of soil to erosion only when the type of chemicals in the eroding fluid are known. Plasticity index will also be good to compare erodibility of two types of soils if other conditions are the same. (Singh-ISWS)
W77-02127

GEOMETRY OF RIPPLES AND DUNES IN ALLUVIAL CHANNELS,
Roorkee Univ. (India). Dept. of Civil Engineering.
K. G. R. Raju, and J. P. Soni.
Journal of Hydraulic Research, Vol. 14, No. 3, p 241-249, 1976. 5 fig, 1 tab, 19 ref.

Descriptors: *Dunes, *Waves(Water), *Alluvial channels, *Flow resistance, *Bed load, Channel morphology, Seiment transport, Analytical techniques, Shear drag, Porosity, Equations, Mathematical studies, Theoretical analysis.
Identifiers: *Bed form geometry, Experimental data, Functional relations.

The bed of an alluvial channel gets deformed into various shapes - resulting in highly varying form resistance - with changes in fluid, sediment, and flow characteristics. Ripples and dunes are the most predominant bed features in natural streams and artificial canals characterized by small slopes. Knowledge of the size of ripples and dunes will make the flow resistance problems tractable. A semi-theoretical approach to the prediction of the average height and length of ripples and dunes was presented. The height of the dune was shown to be related to bed load transport rate and the advance velocity of the dune. The relationships between pertinent parameters were developed with the use of practically all available experimental data. It was learned that the parameters which influence the average length of the dunes also influence the average length of the ripples. The relations for height and length of ripples and dunes were given in dimensionless form. (Singh-ISWS)
W77-02130

DISTRIBUTION OF CALCIUM CARBONATE IN SURFACE SEDIMENTS OF THE ATLANTIC OCEAN,
Lamont-Doherty Geological Observatory, Palisades, N. Y.
For primary bibliographic entry see Field 2L.
W77-02133

DISTRIBUTION OF CARBONATE IN SURFACE SEDIMENTS OF THE PACIFIC OCEAN,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 2L.
W77-02134

CONTROLLING EROSION AND SEDIMENTATION AT CONSTRUCTION SITES,
For primary bibliographic entry see Field 4D.
W77-02146

SEDIMENTATION RATES AND SEDIMENT THICKNESSES IN LAKE CHAMPLAIN: 1975-76,
Vermont Univ., Burlington. Dept. of Geology.
A. S. Hunt.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 356, Price codes: A02 in paper copy, A01 in microfiche. Completion Report, June 1976. 14 p, 5 fig, 2 ref. OWRT A-024-VT. (1). 14-34-0001-6047.

Descriptors: Sedimentation, *Lake sediments, *Sedimentation rates, Bedrock, Lakes, *Vermont, Bathymetry, Lake morphometry.
Identifiers: *Sediment thicknesses, *Lake Champlain(Vt).

Using geophysical techniques the thickness of sediments and shape of the bedrock basin have been studied in central Lake Champlain and compiled as sediment thickness and bedrock topography maps. Four major depressions have been recognized which correspond to maximum areas of sediment accumulation in which sediment thickness exceeds 700 feet. Maximum sedimentation rates in these areas are estimated to be 5 feet per hundred years. Sediment accumulation is most closely related to bedrock configuration rather than distance from shore or proximity to sediment source. With few exceptions the bedrock topography corresponds well with the present day bottom bathymetry.
W77-02193

GEOLOGIC AND PHYSICAL FACTORS AFFECTING LAKE CHAMPLAIN SHORELINE EROSION,
Vermont University, Burlington, Dept. of Geology.
A. S. Hunt, J. P. Olson, and C. R. Durham.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 506, Price codes: A02 in paper copy, A01 in microfiche. Completion Report, June 1976. 20 p, 5 fig, 6 ref. OWRT A-026-VT(1). 14-34-0001-6047.

Descriptors: Erosion, Lakes, *Vermont, *Beach erosion, *Bank erosion, *Lake shores.
Identifiers: *Lake Champlain(Vt).

Profile sites from three characteristic geological settings were surveyed in the Fall of 1975 to permit study of the amount and nature of shoreline movement in Lake Champlain. Two of the sites were resurveyed after the record spring high lake level of 1976. Recession of the toe of the bank was observed in all areas and is attributed to wave action; top bank recession is attributed to slumping and gully wash. A maximum recession of 11 feet at the top of the bank and eight feet at the toe has been observed. Deposition, which occurred in the offshore profiles during high spring lake level, is believed to be a response to the non-equilibrium condition. Factors recognized as of primary importance in the natural control of shoreline erosion are adequate vegetative cover and good bank drainage.
W77-02222

A COMPARISON OF NITROGEN, PHOSPHORUS, AND CARBON IN SEDIMENTS AND SOILS OF CULTIVATED AND NONCULTIVATED WATERSHEDS IN THE NORTH CENTRAL STATES,
Agricultural Research Service, Oxford Miss.
For primary bibliographic entry see Field 5G.
W77-02292

SEDIMENT PROBLEMS IN THE SAVANNAH RIVER BASIN,
Geological Survey, Lakewood, Colo. Water Resources Div.
R. H. Meade.
In: The Future of the Savannah River; Proceedings of a Symposium held at Hickory Knob State Park, McCormick, South Carolina, October 14-15, 1975: Published by Water Resources Research Institute, Clemson University, Clemson, South Carolina. p 105-129, June 1976. 9 fig, 47 ref.

Descriptors: *Sediment transport, *Sedimentation, Sediment load, *Soil erosion, *Streamflow, Sediment yield, Sedimentology, Reservoirs, Alluvium, Estuaries, Topography, Data collections.
Identifiers: *Savannah River(Geo-SC), Piedmont, Fall line.

Sediment in the Savannah River (Georgia-South Carolina boundary) is derived mainly from the parts of the basin that lie above the fall line -- particularly the Piedmont province. Accelerated erosion has stripped some 3 to 4 billion cubic meters of sediment from the Piedmont uplands since 1700. However, more than 90 percent of this sediment has not been carried across the fall line by the river; it remains stored on the hill slopes and in the stream bottoms of the Piedmont. Large reservoirs trap most of the sediment moving down the main stem of the Savannah. The sediment that accumulates in the dredged navigation channels of the estuary is only partly attributable to upland sources; other sources remain to be identified. (Woodard-USGS)
W77-02320

RARE EARTH ELEMENT SUPPLY TO THE OCEAN,
Ecole Normale Superieure, Paris (France). Laboratoire de Geologie.
For primary bibliographic entry see Field 2L.
W77-02478

USE OF LANDSAT DATA FOR NATURAL RESOURCES INVESTIGATION IN THE LOWER BASIN OF DANUBE AND DANUBE DELTA,
Institutul de Constructii din Bucuresti (Rumania). Lab. for Remote Sensing.
For primary bibliographic entry see Field 2L.
W77-02503

2K. Chemical Processes

THE USE OF A SPECIFIC ION ELECTRODE FOR DETERMINATION OF BROMIDE IN SOILS,
Texas Engineering Experiment Station, College Station.
For primary bibliographic entry see Field 2G.
W77-02100

EFFECTS OF PHOSPHORUS ON SOME PHYSICAL AND CHEMICAL PROPERTIES OF CLAYS,
West Pakistan Agricultural Univ., Lyallpur.
For primary bibliographic entry see Field 2G.
W77-02101

SULFUR FRACTIONS AND CARBON-NITROGEN-PHOSPHORUS-SULFUR RELATIONSHIPS IN SOME BRAZILIAN AND IOWA SOILS,
Iowa State Univ., Ames.
For primary bibliographic entry see Field 2G.
W77-02102

EVALUATION OF THE RING OVEN TECHNIQUE FOR WATER MONITORING,
Atlantic Research Corp., Alexandria, Va.
For primary bibliographic entry see Field 5A.
W77-02148

EVALUATION OF THE RING OVEN TECHNIQUE FOR WATER MONITORING, APPENDICES,
Atlantic Research Corp., Alexandria, Va.
For primary bibliographic entry see Field 5A.
W77-02149

CONFIGURATION INTERACTION STUDIES OF THE EXCITED STATES OF WATER,
Aerospace Corp., El Segundo, Calif.
For primary bibliographic entry see Field 1A.
W77-02153

TRACE ELEMENTS IN SOILS OF THE DNIEPER-BUG LIMAN, (IN UKRANIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
For primary bibliographic entry see Field 2G.
W77-02258

EXTRACTION-PHOTOMETRIC DETERMINATION OF MERCURY IN SOIL AND WATER, (IN RUSSIAN),
Uzhgorod State Univ. (USSR).
For primary bibliographic entry see Field 5A.
W77-02272

NITROGEN FIXATION BY ALGAE IN FESCUEGRASS SOIL CRUSTS,
Georgia Univ., Athens. Dept. of Agronomy.
For primary bibliographic entry see Field 2G.
W77-02274

RATE OF DISSOLUTION OF PHOSPHATE FROM MINERALS AND SOILS,
Montana State Univ., Bozeman. Dept. of Chemistry.
For primary bibliographic entry see Field 2G.
W77-02275

THE EFFECT OF AMMONIA AND AMMONIA-SULFUR SOLUTIONS ON NITRIFICATION RATES AND CHEMICAL PROPERTIES OF A CALCAREOUS SOIL,
Texas Tech Univ., Lubbock. Dept. of Agronomy.
For primary bibliographic entry see Field 2G.
W77-02276

POTASSIUM-CALCIUM EXCHANGE EQUILIBRIA IN VOLCANIC-ASH SOILS,
Chile Univ., Santiago. Dept. of Chemistry.
For primary bibliographic entry see Field 2G.
W77-02277

FIXATION OF IRON AND ZINC APPLIED AS CHELATES INTO A SOIL COLUMN DURING LEACHING,
Hebrew Univ., Rehovoth (Israel). Dept. of Soil and Water Science.
For primary bibliographic entry see Field 2G.
W77-02280

DISSOLUTION OF ILLITE--A POSSIBLE MECHANISM OF POTASSIUM RELEASE,
Agricultural Research Organization, Bet-Dagan (Israel). Inst. of Soils and Water.
For primary bibliographic entry see Field 2G.
W77-02283

ENVIRONMENTAL IMPLICATIONS OF N FIXATION BY SOYBEANS,
Illinois Univ. at Urbana-Champaign. Dept. of Agronomy.
For primary bibliographic entry see Field 3C.
W77-02289

POTASSIUM IN AN ARID LOESSIAL SOIL: CHARACTERIZATION BY EQUILIBRIUM RELEASE-ABSORPTION TO STRONG SALT SOLUTIONS,
Washington State Univ., Pullman. Coll. of Agriculture Research Center.
For primary bibliographic entry see Field 2G.
W77-02296

DESCRIPTIONS AND CHEMICAL ANALYSES FOR SELECTED WELLS IN THE CENTRAL SACRAMENTO VALLEY, CALIFORNIA,
Geological Survey, Menlo Park, Calif. Water Resources Div.
R. P. Fogelman.
Open-file report 76-472, July 1976. 71 p, 3 fig, 33 maps, 4 tab.

Descriptors: *Groundwater resources, *Water wells, *Well data, *Water quality, *California, Water utilization, Water yield, Water levels, Drawdown, Chemical analysis, Basic data collections, Sampling.
Identifiers: *Central Sacramento Valley(Calif).

The Sacramento Valley occupies the northern one-third of the Great Central Valley of California. The study area of this report includes about 1,200 square miles (3,100 square kilometers) adjacent to the Sacramento River from Knights Landing to Los Molinos, in parts of Yolo, Sutter, Colusa, Glenn, Butte, and Tehama Counties. Between April and August 1975, 559 wells were canvassed, and during September and October 1975, water samples were collected for chemical analysis from 209 of these wells. Field determinations of alkalinity, conductance, pH, and temperature were made on the site at the time of sampling. Samples were prepared in the field for shipment and analysis for individual constituents at the Geological Survey Central Laboratory, Salt Lake City, Utah. Descriptive data for water wells are listed, chemical data are tabulated, and the location of wells is shown on maps. (Woodard-USGS)
W77-02299

RECONNAISSANCE OF GROUND-WATER RESOURCES OF THE SQUAXIN ISLAND INDIAN RESERVATION, WASHINGTON,
Geological Survey, Tacoma, Wash. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-02308

WATER-QUALITY STUDY OF A REACH OF THE MERCED RIVER IN YOSEMITE NATIONAL PARK AND VICINITY, CALIFORNIA--APRIL 1973 THROUGH SEPTEMBER 1974,
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 5A.
W77-02309

THE MERIDIAN-UPPER WILCOX AQUIFER IN MISSISSIPPI,
Geological Survey, Jackson, Miss. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-02310

MAPS SHOWING GROUND-WATER CONDITIONS IN THE LOWER BIG CHINO VALLEY AND WILLIAMSON VALLEY AREAS, YAVAPAI AND COCONINO COUNTIES, ARIZONA,
Geological Survey, Tucson, Ariz. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-02312

A BIVARIATE-REGRESSION MODEL FOR ESTIMATING CHEMICAL COMPOSITION OF STREAMFLOW OR GROUNDWATER,
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-02317

GROUND-WATER RESOURCES AND GEOLOGY OF ST. CROIX COUNTY, WISCONSIN,
Geological Survey, Madison, Wis. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-02321

GROUND-WATER HYDROLOGY OF THE COCOA WELL-FIELD AREA, ORANGE COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-02323

SILVER CONTENT OF PRECIPITATION FROM SEEDED AND NONSEEDED FLORIDA CUMULI,
Virginia Univ., Charlottesville. Dept. of Environmental Sciences.
J. Wisniewski, W. R. Cotton, and R. I. Sax.
Journal of Applied Meteorology, Vol. 15, No. 9, p 1004-1011, September 1976. 4 fig, 4 tab, 13 ref.

Descriptors: *Silver iodide, *Rainfall, *Florida, Measurement, Chemical analysis, Aircraft, Sampling, Precipitation(Atmospheric), Storms, Chemistry, Chemistry of precipitation, Cloud seeding, Pollutants, Water pollution sources, Meteorology.
Identifiers: *Silver.

A subprogram of NOAA's 1973 Florida Area Cumulus Experiment (FACE) was undertaken to determine the silver content of precipitation associated with convective clouds massively seeded with silver iodide nucleant over southern Florida. An atomic absorption analysis of 127 rainwater samples collected just below cloud base by a polypropylene-lined scoop mounted on the fuselage of the NOAA DC-6 aircraft indicated that the mean concentration of silver obtained on seed days (69 samples) was no greater (and, in fact, appreciably less) than that obtained on no-seed days (58 samples). In both sets of samples, the median concentration of silver was more than two orders of magnitude lower than the U.S. Public Health safety limit of 5 X 10 to the -8th power g/ml. Of the 69 aircraft samples collected on seed days, only two contained a concentration of silver in excess of 1 X 10 to the -9th power g/ml. Of the 58 aircraft samples collected on no-seed days, eight contained silver in concentrations exceeding 1 X 10 to the -9th power g/ml. The samples collected from the aircraft showed higher mean concentrations of silver than did those collected on the ground. An atomic absorption analysis of 79 rainwater samples collected at both fixed and mobile sites on the surface showed that the mean concentration of silver on seed days was three orders of magnitude less than 5 X 10 to the -8th power g/ml; the maximum concentration of silver found in any sample did not exceed 1 X 10 to the -9th power g/ml. Statistical results from the nonparametric Mann-Whitney Wilcoxon test suggest that the surface seeded (34 samples) and surface nonseeded (45 samples) data come from the same population (i.e., no significant differences between the two data sets). There is some evidence (from a separate set

of surface rainwater samples collected upwind of the target area) to suggest a persistently higher (by about a factor of 2 or 3) mean concentration of silver during the course of the experiment than either before of after the experiment. (Sims-ISWS)
W77-02485

MOLECULAR STUDIES OF THE ICE-FORMING CAPABILITIES OF DIFFERENT SURFACES,
Gidrometeorologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 3B.
W77-02487

ELECTRODE KINETICS OF ANTIMONY IN ACIDIC CHLORIDE SOLUTIONS,
California Univ., Los Angeles. School of Engineering and Applied Science.
For primary bibliographic entry see Field 3A.
W77-02533

DETERMINATION OF SURFACE EQUILIBRIA AND MASS TRANSFER RATES IN A CONCURRENT FLOW BUBBLE COLUMN,
California Univ., Berkeley. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 3A.
W77-02535

MODIFICATION OF A COMMERCIAL SPECTROFLUOROMETER FOR RAPID DETERMINATION OF NEAR INFRARED EMISSION,
Auburn Univ., Ala. Charles Richard Saunders Chemical Lab.
W. C. Neely, T. D. Hall, S. Cravitt, and J. H. DeLap.
Applied Spectroscopy, Vol. 29, No. 2, p. 205-206, March-April 1975. 4 fig, 3 ref. OWRT A-035-ALA(8).

Descriptors: Ultraviolet radiation, Instrumentation, Analytical techniques, Spectrophotometry, *Spectrometers, *Fluorometry.
Identifiers: Near infrared emission, Luminescence, Wavelength adapter, *Spectrafluorometers, Phosphorescence.

A simple method is described for extending the spectral region of the Farrand spectrofluorometer Mark I. The wavelength adapter is inexpensive and can be inserted rapidly. A Hamamatsu R-446 photomultiplier tube (PMT) in conjunction with the wavelength adapter extends the spectral region to 900 nm. The fluorescence and phosphorescence spectra of Victoria Blue B in ethanol were obtained in this extended region.
W77-02537

CALCIUM EQUILIBRIUM IN MIXED ION AQUEOUS SYSTEMS OPEN TO THE ATMOSPHERE,
New Mexico State Univ., Las Cruces. Dept. of Agronomy.
G. A. O'Connor, and C. F. Cadena.
Soil Science, Vol. 120, No. 3, p 182-187, 1975. 4 fig., 3 tab., 20 ref. OWRT A-048-NMEX(2).

Descriptors: *Calcite, *Calcium carbonate, *Aqueous solutions, *Equilibrium, Chemical properties, Thermodynamic behavior, Ions.
Identifiers: Ion pairs, Activity coefficients, Partial pressure of CO2.

Calcite solubility is of major importance to geologists and soil scientists, and yet attempts to characterize the system in terms of basic chemical relationships have met with limited success. The model reported herein adequately describes calcite equilibria in aqueous solutions open to the air that have practical significance to both geologists and soil scientists. Equations accounting for activity coefficients and various ion pair formations were sufficient to describe calcite equilibrium in solutions of widely varying ionic characteristics. Sixty out of 73 solutions selected from the literature yielded calculated Kisp values for calcite ranging from 2.6 to 4.0 X 10-9 with an average of 3.3 X 10-9. (Hain-New Mexico State)
W77-02538

2L. Estuaries

EVALUATION OF ESTUARINE SITE DEVELOPMENT LAGOONS,
Cook Coll., New Brunswick, N.J.
For primary bibliographic entry see Field 5G.
W77-02088

ON THE RELIABILITY OF THE SPECTRAL METHOD FOR THE DESIGN OF OFFSHORE STRUCTURES,
Technische Universitaet, Munich (West Germany). Institut fuer Bauinzenieurwesen III.
For primary bibliographic entry see Field 8B.
W77-02129

A MIXED-DIMENSION KINEMATIC ESTUARINE MODEL,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
A. J. Elliott.
Chesapeake Science, Vol. 17, No. 3, p 135-140, September 1976. 7 fig, 5 ref, 1 append.

Descriptors. *Estuaries, *Model studies, *Salinity, *Potomac River, Salt balance, Spring, Equations, Mathematical models, Mixing, Water circulation, Water quality, Biology, Fish, Path of pollutants.

A kinematic model, developed for use during conditions of low salinity when the upper reaches of an estuary are vertically mixed, divides the estuary into one- and two-dimensional regimes. The model was applied to the Potomac by assuming that the estuary is one-dimensional above Maryland Point and two-dimensional seaward of Morgantown. The model appears to reproduce features of estuarine mixing, especially during the spring conditions of low salinity. Such a model may have application to biological problems which involve the transport of fish eggs and larvae. (Humphreys-ISWS)
W77-02131

THE CIRCULATION AND SALINITY DISTRIBUTION OF THE UPPER POTOMAC ESTUARY,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
A. J. Elliott.
Chesapeake Science, Vol. 17, No. 3, p 141-147, September 1976. 8 fig, 3 tab, 6 ref.

Descriptors: *Potomac River, *Circulation, Flow, Profiles, Salinity, Currents, Shear, Return flow, Estuaries, Monthly, Path of pollutants.
Identifiers: *Upper Potomac estuary, *Circulation distribution, *Maryland point, Current data, Salinity distribution, Internal circulation, Reverse flow, Vertical shear.

Salinity and current data from the Upper Potomac estuary were analyzed to determine the intensity of the internal circulation. One set of data, collected during the fall of 1973, suggested that a reverse flow existed as far upstream as Maryland Point. Data taken during other periods indicated that an estuarine circulation, with a reverse flow in the lower layer, was not well developed above Morgantown. However, the net seaward flow did decrease significantly with depth at all stations below Douglas Point and caused vertical shear in the mean profiles. Although there was no direct observational evidence from the measurements, it seemed possible that a return flow existed close to the bottom at some of the stations. Using a 4/3's law, the horizontal eddy diffusivity was estimated to be of the order of 2,000,000/s during April 1974. (Roberts-ISWS)
W77-02132

DISTRIBUTION OF CALCIUM CARBONATE IN SURFACE SEDIMENTS OF THE ATLANTIC OCEAN,
Lamont-Doherty Geological Observatory, Palisades, N. Y.
P. E. Biscaye, V. Kolla, and K. K. Turekian.
Journal of Geophysical Research, Vol. 81, No. 15, p 2595-2603, May 20, 1976. 6 fig, 1 tab, 29 ref. NSF IDO-74-04204, NSF IDO-75-19627.

Descriptors: *Sediments, *Calcium carbonate, *Atlantic Ocean, Surveys, Measurement, Mapping, Distribution, Distribution patterns, Sediment distribution, Spatial distribution, Bathymetry, Depth, Oceans, Chemicals, Carbonates, Calcium compounds, Detritus, Sedimentology, Oceanography.
Identifiers: *Calcium carbonate distribution, Surface sediments.

The areal distribution of calcium carbonate in the surface sediments of the Atlantic Ocean and adjacent seas and oceans was mapped on the basis of over 1700 data points. The following conditions were found to exist: The first-order relation of carbonate distribution to water depth is evident in both the areal distribution and the plots of carbonate versus depth for 11 areas of the Atlantic. Superimposed on this relation are significant variations in both the 100% and the 0% CaC03 depth intercepts, analogous to the (calcite) lysocline and the (calcite) carbonate compensation depth, respectively. Variations in these critical parameters between the 11 areas were related to the three rate processes which control carbonate distributions: surface productivity, dissolution, and dilution by noncarbonate biogenic and nonbiogenic sediment. The areal distribution of carbonate in surface sediments was compared with that in sediments deposited at the end of the last glacial epoch, 18,000 yr B.P., when carbonate abundance was markedly lower. (Sims-ISWS)
W77-02133

DISTRIBUTION OF CARBONATE IN SURFACE SEDIMENTS OF THE PACIFIC OCEAN,
Scripps Institution of Oceanography, La Jolla, Calif.
W. H. Berger, C. G. Adelseck, Jr., and L. A. Mayer.
Journal of Geophysical Research, Vol. 81, No. 15, p 2617-2627, May 20, 1976. 12 fig, 77 ref. NSF GA-41078, ONR N00014-69-A-0200-6049.

Descriptors: *Sediments, *Calcium carbonate, *Pacific Ocean, Mapping, Distribution patterns, Sediment distribution, Spatial distribution, Bathymetry, Depth, Oceans, Chemicals, Carbonates, Calcite, Calcium compounds, Detritus, Recent epoch, Sedimentology, Oceanography
Identifiers: *Calcium carbonate distribution, Surface sediments.

The distribution of carbonate on the floor of the Pacific was remapped on the basis of 1313 points from 80 references stored in the World Ocean Sediment Data Bank of Scripps Institution of Oceanography. Percent distribution maps and carbonate versus depth diagrams generally agreed with previously published information and reflected the major controlling factors of carbonate sedimentation (depth, hydrography, fertility, and sedimentary processes). While carbonate distributions are of limited use in attempting to construct dissolution profiles, major trends were identifiable. In particular, the degree of lowering of the equatorial calcite compensation depth (CCD) together with an estimate of the differences in supply rates between the equator and the sub-

tropical gyre can be used to estimate dissolution rate increase below the lysocline. There was considerable variation in the sharpness of the 'CCD transition,' a concept defined here. This variation was thought to reflect both geographic differences in dissolution rate gradients and redeposition processes (carbonate, deep-sea sediments, calcite, and compensation depth). (Sims-ISWS)
W77-02134

MEASUREMENTS OF THE TURBULENT BOUNDARY LAYER UNDER PACK ICE,
Washington Univ., Seattle. Dept of Geophysics.
For primary bibliographic entry see Field 2C.
W77-02138

TRACKING A GULF STREAM RING WITH SOFAR FLOATS,
Naval Oceanographic Office, Washington, D.C.
R. E. Cheney, W. H. Gemmill, M. K. Shank, P. L. Richardson, and D. Webb.
Journal of Physical Oceanography, Vol. 6, No. 5, p 741-749, September 1976. 9 fig, 2 tab, 16 ref. ONR NR 083-328, NSF 10075-08765.

Descriptors: *Oceans, *Ocean circulation, *Eddies, *Atlantic Ocean, On-site investigations, Circulation, Water circulation, Floats, Buoys, Movement, Currents(Water), Ocean currents, Tracking techniques, Oceanography.
Identifiers: *Gulf Stream, *Gulf Stream rings, *Sargasso Sea.

An experiment to test the feasibility of tracking Gulf Stream rings with neutrally buoyant SOFAR floats was begun in September 1974. Three floats were launched at depths of 750, 1050, and 1080 m in a ring west of Bermuda. One float left the ring after 3 weeks. The other two floats remained in the ring for 2-3 months while it moved 375 km westward at a rate of 6 cm/s; they were subsequently entrained by the Gulf Stream off Cape Hatteras. A second ring seeded with floats coalesced with the Gulf Stream, and five of its six floats were carried eastward in the Stream. The sixth float drifted south out of the ring and into the Sargasso Sea. One float was launched in the Sargasso between the two rings; its net drift over a 6-month period was to the west at 1.1 cm/s. These results indicated that there is considerable exchange of water between a ring and surrounding water at depths of 750 to 1100 m and that rings can be tracked for periods of only a few months with SOFAR floats at these depths. Paths of the three floats tracked in the northwestern Sargasso Sea outside of rings and the Stream indicated a net westward drift approximately equal to the observed westward movement of rings in this region. (Sims-ISWS)
W77-02139

GULF STREAM KINEMATICS INFERRED FROM A SATELLITE-TRACKED DRIFTER,
Texas A and M Univ., College Station. Dept. of Oceanography.
A. D. Kirwan, Jr, G. McNally, and J. Coehlo.
Journal of Physical Oceanography, Vol. 6, No. 5, p 750-755, September 1976. 5 fig, 11 ref. ONR N00014-75-C-0537.

Descriptors: *Oceans, *Ocean circulation, *Atlantic Ocean, Floats, Buoys, Satellites(Artificial), Circulation, Water circulation, Currents(Water), Ocean currents, Tracking techniques, Velocity, Energy, On-site investigations, Drift bottles, Oceanography, Remote sensing.
Identifiers: *Gulf Stream, Kinetic energy, Kinematics, Acceleration.

A drifter was deployed in the Gulf Stream and tracked for 5 months by the Nimbus 6 satellite. From this experiment the technical capability of the satellite fixing system was assessed for measuring ocean currents, the drifter trajectory as it relates to the Gulf Stream position as determined by other independent means, and the kinematics and accelerations following the Stream axis. It was shown that the trajectory agrees quite well with the other data on the location of the Gulf Stream. The velocities, accelerations and kinetic energies derived from the trajectory were compared with previous studies. A comparison was made of the kinetic energy of the Gulf Stream as inferred from the drifter with some recent calculations made from ship drift. (Sims-ISWS)
W77-02140

DISTRIBUTION OF SALINITY AND TEMPERATURE IN THE HUDSON ESTUARY,
City Univ., of New York. Inst. of Marine and Atmospheric Sciences.
E. S. Posmentier, and J. W. Rachlin.
Journal of Physical Oceanography, Vol. 6, No. 5, p 775-777, September 1976. 2 fig, 7 ref.

Descriptors: *Salinity, *Temperature, *Estuaries, Mixing, On-site investigations, Measurement, Surveys, Distribution patterns, Spatial distribution, Circulation, Water circulation, Hudson River, *New York.
Identifiers: *Temperature-salinity relationships, *Hudson River estuary.

Vertical salinity profiles in the Hudson Estuary are extremely variable and often contain finestructure similar to that in oceanic stratification. This finestructure may be caused by the stability-dependent vertical diffusion of salt. The interpretation of T-S diagrams indicated that, to a first order, temperature and salinity are controlled by conservative mixing processes and that residence time in the Estuary is approximately one or two weeks. (Sims-ISWS)
W77-02141

OXYGEN IN A TIDAL RIVER: LOW TIDE CONCENTRATION CORRELATES LINEARLY WITH LOCATION,
North Carolina Univ. at Chapel Hill. Marine Sciences Program.
D. Frakenberg.
Estuarine and Coastal Marine Science, Vol. 4, No. 4, p 455-460, July 1976. 3 fig, 15 ref. NSF GA23488, GA34793.

Descriptors: *Dissolved oxygen, *Estuaries, *Georgia, *Tidal streams, Intertidal areas, Estuarine environment, Lagoons, Tidal waters, Tidal effects, On-site investigations, Surveys, Oxygen, *Path of pollutants.
Identifiers: *Duplin River(Ga), Low tide.

A two-year survey of dissolved oxygen distribution in the Duplin River, Georgia, was initiated in December 1971. The Duplin is a 12 km lagoon-type tidal river draining about 1142 hectares of salt marshes along the western edge of Sapelo Island, Georgia. It is a typical lagoon-type tidal river, i.e. and elongate, dendritic watercourse, parallel to shore and separated from the ocean by a barrier island. The circulation is dominated by tidal currents; but, since the lagoon ends blindly in surrounding salt marshes, it has no significant source of upland drainage, and its waters are rarely diluted measurably by freshwater from land runoff. Low tide dissolved oxygen concentration correlates with location along the course of the Duplin River. Concentration generally decreases with distance upstream, although the reverse situation also occurs. The relationship is linear and can be used predictively. The influence on this relationship of tidal circulation, in situ oxygen consumption and production, and rainfall was discussed. (Humphreys-ISWS)
W77-02145

A COMPARISON OF LUMPED-PARAMETER AND DIFFUSIONAL MODELS DESCRIBING THE EFFECTS OF THE OUTLET BOUNDARY CONDITIONS ON THE MIXING IN FLOW SYSTEMS,
City Coll., New York. Dept. of Chemical Engineering.
Y. Zivrin, and R. Shinnar.
Water Research, Vol 10, No 9, p 765-779, 1976. 12 fig, 2 tab, 21 ref, 2 append.

Descriptors: *Model studies, *Estuaries, *Dispersion, Mixing, Coasts, Outlets, Mass transfer, Diffusion, Flow, Mathematical models, Equations, Tidal effects, Inlets(Waterways), Flow system.
Identifiers: Diffusional model, Lumped-parameter model.

A comparison was presented between two methods of modeling the dispersion and mixing processes in large (geophysical) turbulent flow systems such as estuaries, coastal waters, and atmospheric systems. One method was based on the diffusional model, and the other was a lumped-parameter model referred to as 'box-model' or compartmental model. The models were compared on the basis of model free parameters defined here: the purging rate and remaining life distribution. It was found that there exists a good agreement between the results of both models for a one-dimensional system. The problem of the boundary condition at the outlet was discussed; it was concluded that the use of a mass transfer coefficient may be justified in some cases where inflows at the outlet (e.g., due to tidal motion) can be estimated. When these inflows are strong, a sink at the outlet can be taken as a boundary condition. (Humphreys-ISWS)
W77-02147

SWIMMING OF SLENDER FISH IN A NON-UNIFORM VELOCITY FIELD,
Massachusetts Inst. of Tech., Cambridge. Dept. of Ocean Engineering.
J. N. Newman.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A021 564, Price codes: A02 in paper copy, A01 in microfiche. Reprint from the Journal of the Australian Mathematical Society, Vol. 19 (Series B), Part 1, p 95-111, 1975. 3 fig, 12 ref. ONR N00014-67-A-0204-0023, NSF GK-43886X.

Descriptors: *Fish, *Swimming, *Model studies, *Mathematical models, Mathematics, Velocity, Waves(Water), Hydrodynamics, Fish behavior, Oceans, Aquatic life.
Identifiers: *Fish hydrodynamics, Slender body theory, Porpoises.

The hydrodynamic pressure forces acting upon a slender fish were derived for the case of a fish swimming in a non-uniform velocity field. Possible applications are the effects on fish propulsion of swimming in waves, in turbulent eddies, and in the presence of other fish or a moving ship. The fish was assumed to be a slender body, with no vorticity shed into the fluid except at a single abrupt trailing edge located at the posterior end of the fish, and to be performing small lateral swimming undulations of its body. The non-uniform field through which the fish swims was assumed to be irrotational, and this field as well as the body undulations must be slowly-varying on the length-scale of the lateral fish dimensions. Expressions were derived for the local force and the time-averaged total thrust force. These were applied to the study of steady-state bow-riding and wave-riding of porpoises. (Sims-ISWS)
W77-02155

FOURTH SEMIANNUAL INTERAGENCY BRIEFING, FEBRUARY 1975, WASHINGTON, D.C.,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Environmental Effects Lab.
For primary bibliographic entry see Field 8G.
W77-02158

THEORETICAL MONOCHROMATIC-WAVE-INDUCED CURRENTS IN INTERMEDIATE WATER WITH VISCOSITY AND NONZERO MASS TRANSPORT,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
T. A. Talay.
Report NASA TM X-3312, December 1975. 27 p, 5 fig, 12 ref, 1 append.

Descriptors: *Model studies, *Currents(Water), *Waves(Water), *Water circulation, Mathematical models, Mass transfer, Oceans, Continental shelf, Velocity, Circulation, Boundary layers, Equations, Oceanography.
Identifiers: *Wave-induced mass-transport currents.

Some wave-induced mass-transport current theories with both zero and nonzero net mass (or volume) transport of the water column are reviewed. A relationship based on the Longuet-Higgens theory was derived for wave-induced, nonzero mass-transport currents in intermediate water depths for a viscous fluid. The relationship was in a form useful for experimental applications; therefore, some design criteria for experimental wave-tank tests were also presented. Sample parametric cases for typical wave-tank conditions and a typical ocean swell were assessed by using the relation in conjunction with an equation developed by Unluata and Mei for the maximum wave-induced volume transport. Calculations indicated that substantial changes in the wave-induced mass-transport current profiles may exist dependent upon the assumed net volume transport. A maximum volume transport, corresponding to an infinite channel or idealized ocean condition, produced the largest wave-induced mass-transport currents. These calculations suggested that wave-induced mass-transport currents may have considerable effects on pollution and suspended-sediments transport as well as buoy drift, the surface and midlayer water-column currents caused by waves increasing with increasing net volume transports. Some of these effects were discussed. (Sims-ISWS)
W77-02159

THE AQUACULTURE OF FRESH WATER PRAWNS, MACROBRACHIUM SPECIES,
Oceanic Inst., Waimanalo, Hawaii.
For primary bibliographic entry see Field 3E.
W77-02209

FATE AND EFFECTS OF OIL POLLUTANTS IN EXTREMELY COLD MARINE ENVIRONMENTS,
Louisville Univ., Ky.
For primary bibliographic entry see Field 5C.
W77-02210

EXCHANGE OF NUTRIENTS AND TRACE METALS BETWEEN MARSH SEDIMENTS AND ESTUARINE WATERS - A FIELD STUDY,
Clemson Univ., S. C. Dept. of Chemistry and Geology.
For primary bibliographic entry see Field 5B.
W77-02217

MAINE RIVERS BIBLIOGRAPHY- A USER'S MANUAL,
Research Inst. of the Gulf of Maine, Portland.
For primary bibliographic entry see Field 10C.
W77-02224

THE MERCURY CONTENT OF MOLLUSKS IN THE PONTEVEDRA ESTUARY AS A MEASURE OF ITS DEGREE OF MERCURY CONTAMINATION, (IN SPANISH),
Institut Espanol de Oceanografia, Madrid (Spain). Central Labs.
For primary bibliographic entry see Field 5A.
W77-02226

REACTIONS OF WHITE SEA ORGANISMS TO A DECREASE OF SALINITY IN CONNECTION WITH FRESHWATER DISCHARGE INTO BAYS, (IN RUSSIAN),
Akademiya Nauk SSSR, Leningrad. Zoologicheskii Institut.
V. V. Khlebovich.
Gidrobiol Zh 11(5), p 88-91, 1975.

Descriptors: *Salinity, *Bays, Aquatic animals, Migration, Reproduction, Oceans, Freshwater, *Saline water-freshwater interfaces.
Identifiers: *White Sea(USSR).

Recommendations are given relative to the discharge of fresh water into the sea to minimize the adverse effects on the marine fauna. Large masses of fresh water should be discharged at the initial phase of the ebb tide; the layer of fresh water should not be greater than the height of the tide range, which precludes its effect on sublittoral stenohaline organisms. Considerable masses of fresh water in the littoral should be avoided since a lethal effect can occur at 5-8% salinity. There is a particular danger in the discharge of large masses of fresh water during intense reproduction of boreal species. Discharge of water should begin gradually to avoid shock in animals that migrate.--Copyright 1976, Biological Abstracts, Inc.
W77-02233

INFLUENCE OF MERCURY, LEAD, CADMIUM AND COPPER ON PRIMARY PRODUCTION AND PHYTOPLANKTON IN SOME COASTAL AREAS OF THE MEDITERRANEAN AND RED SEAS, (IN RUSSIAN),
For primary bibliographic entry see Field 5C.
W77-02249

ANALGOLOGICAL SURVEY OF THE SONDELEDFJORD NEAR RISOR, S. NORWAY: A 'LAND-LOCKED' FJORD EXPOSED TO POLLUTION, (IN NORWEGIAN),
Oslo Univ. (Norway). Inst. of Zoology.
For primary bibliographic entry see Field 5B.
W77-02252

EFFECT OF SALINIZATION ON HYDROMACROPHYTES OF THE KUBAN ESTUARIES, (IN RUSSIAN),
Azovskii Nauchno-Issledovatelskii Institut Rybnogo Khozyaistva, Rostov-na-Donu (USSR).
A. G. Shekhov.
Ekologiya 5(5), p 62-67, 1974.

Descriptors: *Salinity, *Estuaries, Vegetation, Aquatic plants, Europe, Sea water, *Halophytes.
Identifiers: *Chara, Kuban, Macrophytes, *Myriophyllum, Phytomass, *Potamogeton-pectinatus, Russian-SFSR, USSR, Euryhalines, Glycophiles, *Kuban estuaries(USSR).

In 1969-1970 changes in the vegetation of the Gorki estuaries of the Kuban estuaries (Russian SFSR, USSR) due to salinization were studied. During the summer they were pumped out and filled with seawater. The species composition of the vegetation was greatly impoverished, decreasing from 27-7 spp. with the elimination of all glycophiles, the preservation of only the euryhalines and the appearance of a halophyte. The composition, structure, area and projective cover of the phytocenosis was altered and the yield of the aboveground phytomass of the aquatic plants was greatly reduced. As a result, the types of emergent vegetation of these estuaries changed from Potomageton pectinatus-Myriophyllum-Chara, into Myriophyllum-P. pectinatus.--Copyright 1976, Biological Abstracts, Inc.
W77-02255

NITROGEN LOSSES FROM SOILS OF THE NORTH CAROLINA COASTAL PLAIN,
North Carolina State Univ., Raleigh. Dept. of Soil Science.
For primary bibliographic entry see Field 5B.
W77-02294

THE DISTRIBUTION OF TWO MOSQUITO-LARVIVOROUS FISHES, GAMBUSIA AFFINIS AND ORYZIAS LATIPES, IN THE TOKYO METROPOLITAN AREA, (IN JAPANESE),
Tokyo Univ. (Japan). Dept. of Parasitology.
For primary bibliographic entry see Field 5G.
W77-02297

POTENTIAL FOR DEVELOPMENT OF GROUND WATER AT A TEST SITE NEAR TRURO, MASSACHUSETTS,
Geological Survey, Boston, Mass. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-02306

EFFECTS OF WATER MANAGEMENT ON FRESH-WATER DISCHARGE TO BISCAYNE BAY,
Geological Survey, Tallahassee, Fla. Water Resources Div.
For primary bibliographic entry see Field 4A.
W77-02314

SEDIMENT PROBLEMS IN THE SAVANNAH RIVER BASIN,
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 2J.
W77-02320

MODELING COLIFORM-BACTERIA CONCENTRATIONS AND PH IN THE SALT-WEDGE REACH OF THE DUWAMISH RIVER ESTUARY, KING COUNTY, WASHINGTON,
Geological Survey, Tacoma, Wash. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-02324

ESTUARINE POLLUTION CONTROL: OBJECTIVES AND PRIORITIES,
For primary bibliographic entry see Field 5G.
W77-02343

OCEAN DUMPING PHASE-OUT IN EPA REGION II,
For primary bibliographic entry see Field 5E.
W77-02393

ZOOPLANKTON OF THE REGION OF NOSY-BE: VI. PTEROPODS, HETEROPODS: I HOLONERITIC AND INTERNAL-NERITIC SPECIES; CONTRIBUTION TO THE STUDY OF A TROPICAL EUTROPHIC BAY, (IN FRENCH)
Office de la Recherche Scientifique et Technique Outre-Mer, Nosy-Be (Madagascar). Centre Oceanographique (ORSTOM) de Nosy-Be.
For primary bibliographic entry see Field 5C.
W77-02416

KELP HABITAT IMPROVEMENT PROJECT,
California Inst. of Tech., Pasadena. W. M. Keck Lab. of Environmental Engineering Science.
W. J. North.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-249 919. Price codes: A06 in paper copy, A01 in microfiche. Annual Report, 1974. 115 p. 34 fig., 17 tab., 71 ref. GH-92.

Descriptors: Habitats, *Planting management, *Kelps, Cultures, Storage, Marine algae, Vegetation establishment, Phaeophyta, Nutrient requirements, California, Littoral, Oceans.

Identifiers: *Macrocystis, Egreria laevigata, Cystoseira osmundacea, *Kelp Habitat Improvement Project, Seaweed, Sea urchins.

The results of kelp habitat improvement off the Southern California coast, for fiscal year 1974 are reported. Principal findings included: (1) 1973 harvests from the La Jolla and Point Loma kelp beds fell by 60% and 75% respectively, probably due to severe winter storms, (2) destruction of the Macrocystis canopies at Point Loma was accompanied by changes in the size distributions of the sea urchins, Strongylocentrotus franciscanus and S. purruratus, (3) the north Imperial Beach site was again overrun by seaweed-grazing urchins, (4) kelp restoration in the coastal region from Newport Bay to Laguna Beach is virtually complete, (5) kelp beds between Monarch Bay and Dana Point were greatly expanded, reversing a fifteen year trend of deterioration, (6) Macrocystis plants were introduced to Abalone Cove, (7) a massive development of Egregia and Cystoseira occurred along the Palos Verdes Peninsula, (8) further observations on seasonality patterns of fruiting by Laminaria, Eisenia, Pterygophora, and Agarum were recorded, and (9) Macrocystis developed naturally in areas cleared of Laminaria and Pterygophora, and were transplanted in several areas of Point Loma and La Jolla. Results of laboratory studies involving Macrocystis culture, nutrition, storage, and dispersion are also reported. In addition, a wide variety of studies relating to the effect of sea urchins on seaweed cover is summarized. (Luedtke-Wisconsin)
W77-02417

SALT MARSH ESTABLISHMENT AND DEVELOPMENT,
Environmental Concern, Inc., St. Michaels, Md.
For primary bibliographic entry see Field 4D.
W77-02420

DETRITAL UTILIZATION BY THE POLYCHAETE, CAPITELLA CAPITATA,
Woods Hole Oceanographic Institution, Mass. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W77-02435

NITRATE REMOVAL FROM WATER AT THE WATER-MUD INTERFACE IN WETLANDS,
Louisiana Agricultural Experiment Station, Baton Rouge.
For primary bibliographic entry see Field 5G.
W77-02441

BIOLOGY OF BLUE-GREEN ALGAE OF TIDE MARSHES,
Delaware Univ., Lewes. Coll. of Marine Studies.
For primary bibliographic entry see Field 5C.
W77-02446

PARTIAL WAVE DAMPING IN PNEUMATIC BREAKWATERS,
Royal Norwegian Air Force Academy, Trondheim.
For primary bibliographic entry see Field 8B.
W77-02455

EVALUATION OF CIRCULATION IN ESTUARIES,
Lawler, Matusky and Skelly Engineers, Tappan, N.Y.
D. A. Abood, and E. L. Bourodimos.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 102, No. HY9, Proceedings Paper 12408, p 1211-1224, September 1976. 6 fig, 23 ref, 2 append.

Descriptors: *Density, *Flow, *Estuaries, Hudson River, *New York, Fluid mechanics, Hydraulics, Turbulence, Velocity, Equations, Water circulation, On-site investigations, Currents(Water).
Identifiers: *New York Harbor, *Stratified estuaries, Ocean-derived salt, Nontidal flow, Density-induced circulation.

Several approaches for describing density-induced circulation patterns in partially stratified estuaries have been developed. Published techniques developed by several investigators and recently established methods which were used to convert Hudson River tidal velocities and salinity observations to density-induced flow rates were reported in this paper. Generally, the two-layer stratified flow system approach exhibited several favorable characteristics such as relatively more stable and predictable distribution; greater independence of temporary meteorological and local eddy conditions; and simplicity, ease, and availability of more precise detection instruments. Density-induced flow values obtained using the two-layer flow method were more realistic than their salt budget counterparts and were somewhat higher than those derived from tidal velocity observations. (Roberts-ISWS)
W77-02456

MATHEMATICAL MODELS IN HYDRAULICS AND COASTAL ENGINEERING,
International Courses in Hydraulic and Sanitary Engineering, Delft (Netherlands).
For primary bibliographic entry see Field 2A.
W77-02471

ARE THE CHESAPEAKE BAY WATERS WARMING UP,
Johns Hopkins Univ., Baltimore, Md. Dept. of Geography and Environmental Engineering.
D. K. Brady.
Chesapeake Science, Vol 17, No 3, p 225-227, September 1976. 5 fig, 3 ref.

Descriptors: *Chesapeake Bay, *Bays, *Meteorological data, Nuclear powerplants, Water temperature, Air temperature, Thermal water, Time series analysis, Correlation analysis, Waste water(Pollution), Heated water, Water pollution, Maryland, Virginia, *Thermal pollution.
Identifiers: *Bay waters, *Calvert Cliffs nuclear powerplant, *Baltimore Harbor, Surface water temperature, Warming trend, Trends, Standard deviation, Probability of exceedence.

Now, while the Calvert Cliffs Nuclear Power Plant of the Baltimore Gas and Electric Company begins to discharge waste heat into the Chesapeake Bay near Scientists Cliffs, it is pertinent to establish a historical data base for use in judging possible long-term temperature effects of thermal plants on the waters of the bay. The longest, published, continuous time series of water temperature data pertaining to the Chesapeake Bay region is a 49-year record of daily surface water temperatures taken at Fort Henry in Baltimore Harbor by the U.S. Coast and Geodetic Survey from 1914 through 1962. The water temperature data was summarized in 1972. From that data it was learned that temperatures appeared to be increasing at a mean rate of 0.265 C per decade. It is pertinent to ask if surface waters in Baltimore Harbor have been responding slowly to cumulative thermal discharges from the four power plants located in the harbor. The apparent warming trend probably did not extend beyond 1962 according to subsequent observations. A study of a 95-year record of air temperature data pertaining to the Chesapeake Bay region showed that water temperatures and nearby air temperatures responded to the same or similar regional meteorological differences. At that time, the Calvert Cliffs Nuclear Power Plant began to discharge waste heat into Chesapeake Bay, so it was important to determine any previous trend in the harbor water temperature that could be ascribed only to man's activities. Apparently, no such tend could be determined. (Roberts-ISWS)
W77-02472

WATER MOTION ON A BEACH IN THE PRESENCE OF A BREAKWATER: 1. WAVES,
Cornell Univ., Ithaca, N.Y. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 8B.
W77-02474

WATER MOTION ON A BEACH IN THE PRESENCE OF A BREAKWATER: 2. MEAN CURRENTS,
Cornell Univ., Ithaca, N.Y. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 8B.
W77-02475

SPECTRAL CHARACTERISTICS OF THE MICROWAVE EMISSION FROM A WIND-DRIVEN FOAM-COVERED SEA,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
W. J. Webster, Jr., T. T. Wilheit, D. B. Ross, and P. Gloersen.
Journal of Geophysical Research, Vol. 81, No. 18, p 3095-3099, June 20, 1976. 4 fig, 3 tab, 16 ref.

Descriptors: *Microwaves, *Arctic, *Winds, *Oceans, *Remote sensing, Aircraft, Waves(Water), Fetch, Wavelengths, Investigations, Oceanography.
Identifiers: *Bering Sea, Microwave emission, Sea foam.

Aircraft observations of the microwave emission from the Bering Sea showed that the spectral character of brightness temperature variation with wind speed in a fully developed sea is due to a combination of surface roughness and a surface layer with varying dielectric constant over a physical depth of a few millimeters. The varying dielectric layer is identified with cusps formed by the bubbles associated with thin foam streaks. Computations of the radiative transfer through such a layer showed that the change in microwave emissivity due to the presence of that layer decreases as microwave wavelength increases. Since foam streak coverage on the ocean surface increases with surface wind speed, the increase in microwave brightness temperature with increasing wind speed will be less at longer wavelengths, a characteristic that is observed in the experimental results presented. In addition, it was observed that in fetch-limited situations the microwave brightness temperature depends in the same way on surface wind speed but is essentially independent of varying foam coverage, the implication being that the surface wave structure becomes more important in determining the microwave brightness temperatures as fetch approaches zero. It appears that microwave brightness temperatures are directly related to ocean surface wind speeds, regardless of fetch. (Sims-ISWS)
W77-02476

THE EFFECT OF THE GEOSTROPHIC FLOW UPON COASTAL SEA ELEVATIONS IN THE NORTHERN NORTH PACIFIC OCEAN,
Scripps Institution of Oceanography, La Jolla, Calif.
J. L. Reid, and A. W. Mantyla.
Journal of Geophysical Research, Vol. 81, No. 18, p 3100-3110, June 20, 1976. 15 fig, 36 ref.

Descriptors: *Sea level, *Water levels, *Pacific Ocean, *Subarctic, Water level fluctuation, Circulation, Water circulation, Seasonal, Coasts, Atmospheric pressure, Currents(Water), Ocean currents, Ocean circulation, Oceanography.
Identifiers: Steric heights, Gyres.

Coastal sea elevations measured at tide gages in the northern North Pacific when adjusted for the atmospheric pressure show a seasonal high in winter (November-February). This high is well out of phase with the mid-ocean response of geopotential anomaly (steric height) to the heating and cool-

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ing cycle which produces highest steric elevations in JulybOctober. This paper reported an attempt to show that steric height near the coast varies seasonally in phase with the measurements at the tide gages and that the high elevations in winter are a consequence of the circulation of the subarctic cyclonic gyre of the North Pacific Ocean. The flow of the coastal limb of this gyre (along the eastern, northern, and western boundary of the ocean) is intensified in winter, and in geostrophic balance the sea surface slopes upward toward the coast, accounting for the winter rise. Sea elevation along the eastern boundary as determined from steric height does not slope uniformly downward from the equator toward higher latitudes but has several maxima and minima. These appear to be the consequence of the sea surface slopes associated with the quasi-geostrophically balanced system of cyclonic and anticyclonic gyres in middle and high latitudes and zonal flows near the equator. (Sims-ISWS)
W77-02477

RARE EARTH ELEMENT SUPPLY TO THE OCEAN,
Ecole Normale Superieure, Paris (France). Laboratoire de Geologie.
J-M. Martin, O. Hogdahl, and J. C. Philippot
Journal of Geophysical Research, Vol. 81, No. 18, p 3119-3124, June 20, 1976. 4 fig, 3 tab, 47 ref.

Descriptors: *Suspended solids, *Sediments, *Oceans, *Rivers, Dissolved solids, Geochemistry, Chemical analysis, Erosion, Foreign countries, Sedimentology, Oceanography.
Identifiers: *Rare earth elements, *Amazon River, *Congo River, *Ganges River, *Mekong River, *Gironde estuary(France), Sediment sources.

More insight on rare earth element pathways from land to ocean came from analyses of suspended matter in four major world rivers (Amazon, Congo, Ganges, Mekong), while their geochemical behavior at the river-ocean boundary was studied in the Gironde estuary (France). The Gironde data indicated that soluble rare earth elements are removed from solution in the estuarine zone; this observation invalidates any rare earth element balance to the ocean which would not take into account the river-ocean boundary processes. Data on rare earth element concentrations in soluble and detrital river loads showed that solid discharge represents the major part of rare earth elements supplied by rivers to the ocean. A rare earth material balance to the ocean was discussed on the basis of the results presented in this paper. (Sims-ISWS)
W77-02478

THE BARROW SUBMARINE CANYON: A DRAIN FOR THE CHUKCHI SEA,
Washington Univ., Seattle. Applied Physics Lab.
G. R. Garrison, and P. Becker.
Journal of Geophysical Research, Vol. 81, No. 24, p 4445-4453, August 20, 1976. 14 fig, 12 ref.

Descriptors: *Submarine canyons, *Arctic, *Arctic Ocean, Flow, Circulation, Water circulation, Ocean circulation, Salinity, Density, Temperature, Water temperature, Surveys, Measurement, Oceanography.
Identifiers: *Chukchi Sea, *Beaufort Sea, *Barrow Canyon.

Oceanographic measurements made in the spring through holes in the ice in an area off Barrow, where the Barrow Canyon forms a sloping through from the shallow Chukchi Sea into the deep Beaufort Sea, revealed two interacting water movements: (1) a flow of highly saline water from the shallow Chukchi Sea into the Beaufort Sea through the Barrow Canyon, and (2) an uprising of Atlantic water from the depths of the Beaufort Sea into the Barrow Canyon. (Sims-ISWS)
W77-02481

ICE MOVEMENT AND DISTRIBUTION IN THE BERING SEA FROM MARCH TO JUNE 1974,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 2C.
W77-02482

A TECHNIQUE FOR ESTIMATING TROPICAL OPEN-OCEAN RAINFALL FROM SATELLITE OBSERVATIONS,
Hawaii Univ., Honolulu. Dept. of Meteorology.
For primary bibliographic entry see Field 2B.
W77-02484

MULTIDISCIPLINARY APPLICATION OF LANDSAT-2 DATA TO MARINE ENVIRONMENT IN CENTRAL JAPAN,
Toba Merchant Marine Coll. (Japan).
H. Ochiai.
Available from the National Technical Information Service, Springfield, VA 22161 as N76-18590, Price codes: A02 in paper copy, A01 in microfiche. Quarterly Progress Report E76-10169, 1976. 16 p, 15 fig, 1 tab, 2 ref. NASA LANDSAT Inv. No. 28990.

Descriptors: *Remote sensing, *Bays, *Water quality, *Red tide, Aircraft, Satellites(Artificial), Aerial photography, Data collections, Investigations, Water temperature, Coasts, Foreign countries, Estuaries, Rivers, Pollutant identification.
Identifiers: *LANDSAT, *Japan

Remote sensing data obtained by LANDSAT-2 are very useful for monitoring the marine environment throughout the year. This quarterly progress report describes the multi-disciplinary application of multi-spectral scanner data acquired over central Japan which revealed several coastal features, pollution, river effluent, coastal process, etc., with the supporting data obtained by airborne remote sensing. (Sims-ISWS)
W77-02498

USE OF LANDSAT DATA FOR NATURAL RESOURCES INVESTIGATION IN THE LOWER BASIN OF DANUBE AND DANUBE DELTA,
Institutul de Constructii din Bucuresti (Rumania). Lab. for Remote Sensing.
N. Oprescu.
Available from the National Technical Information Service, Springfield, VA 22161 as N76-20605, Price codes: A02 in paper copy, A01 in microfiche. Report NASA-CR-146631, December 1975. 12 p, 1 tab.

Descriptors: *Remote sensing, *Rivers, *Sediments, Satellites(Artificial), Data processing, Water resources, Water quality, Runoff, Sedimentation, Eutrophication, Deltas, Foreign countries, Pollutant identification.
Identifiers: *LANDSAT, *Romania, *Danube River, Danube delta.

Due to the delay in the receipt of data, the program of the investigation developments had to be revised. Also, meteorological conditions were unfavorable, thus the accomplishment of the concordance between airborne and space recordings during periods of utmost interest for investigation was impeded. However, the recordings on bands 4 and 5 very clearly showed the sedimentary discharge in sea water at the mouth of the Danube while recordings on bands 6 and 7 showed the successive stages of the evolution of the Danube Delta, clearly marking the separation of the fluvial delta from the marine delta. (Sims-ISWS)
W77-02503

NOTES ON TIDAL INLETS ON SANDY SHORES,
California Univ., Berkeley.
M. P. O'Brien.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-02[illegible] 328, Price codes: A03 in paper copy, A01 in microfiche. Report of Army Corps of Engineers, Ft. Belvoir, VA., Coastal Engineering Research Center, GITI Report 5, February 1976. 26 p, 7 fig, 12 ref. CERC DACW72-71-C-0005.

Descriptors: *Inlets(Waterways), *Shores, *Tides, *Waves(Water), Coasts, Bays, Estuaries, Beaches, Tidal waters, Tidal effects, Tidal bores, Hydraulics, Model studies, Hydraulic models, Ocean waves, Channels, Flow, Channel flow.

This report presented observations, theories, an analysis that have been found to be applicable t the rational design of coastal inlets. The repo also presented various memoranda on th behavior and sedimentary and hydraulic charac teristics of tidal inlets on sandy shorelines and intended to represent a source of ideas for gradu ate thesis studies as well as a stimulant to othe research workers in this field. (Sims-ISWS)
W77-02504

AN EFFECT OF PERMEABILITY ON SAN TRANSPORT BY WAVES,
National Bureau of Standards, Washington, D. C. Inst. for Basic Standards.
K. E. B. Lofquist.
Available from the National Technical Inform tion Service, Springfield, VA 22161 as AD-A0[illegible] 641, Price codes: A04 in paper copy, A01 microfiche. Report of Army Corps of Engineer Ft. Belvoir, Va., Coastal Engineering Researc Center, Technical Memorandum No. 6 December 1975. 74 p, 20 fig, 19 ref, 2 append.

Descriptors: *Waves(Water), *Sand *Permeability, Sand waves, Ripple mark Laboratory tests, Model studies, Coasts, Beache Coastal engineering.
Identifiers: *Sand transport, Permeability effect Ripple profiles, Coastal processes, Oscillato flow.

Permeability effects on the movement of sand oscillatory flows were observed in laboratory e periments which approximate prototype con tions at the seabed under progressive waves. natural sand was used, wave periods rang between 3 and 14 seconds, and sand surfaces we naturally rippled. The apparatus had a symmet which removes all effects, except those permeability, which might cause a net moveme of sand. Onshore and offshore directions we determined by phase relationships between t horizontal flows and superposed vertical perme bility flows. A positive permeability effect w found in that the ripple profiles move in t onshore direction. The velocity of this motion w measured and described in a simple, dimensionl plot. The associated net transport of sand was n observed directly but can be inferred, to an exte from the motions of the ripple profiles. The effe of permeability are cumulative and can be sign cant in coastal processes of long duration. A estimate of the local rate of sand transport onsh due to permeability involves the distribution permeabilities within the seabed which are larg unknown. An overall estimate is less than 1 cu meter per meter of shoreline per year, which negligible for most engineering consideratio (Sims-ISWS)
W77-02508

TOXICITY, UPTAKE AND SURVEY STUDI OF BORON IN THE MARINE ENVIRONMEN
Fisheries and Marine Service, West Vancou (British Columbia). Pacific Environment Inst.
For primary bibliographic entry see Field 5C.
W77-02565

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

PROSPECTS FOR AN AGRO-INDUSTRIAL COMPLEX ON THE GAZA-SINAI SEA COAST,
State Univ. of New York at Buffalo.
J. Haupert.
Ecumene, Vol. 7, p 21-24, February, 1975. 1 fig, 9 ref.

Descriptors: *Water costs, *Water resources development, *Potential water supply, *Water supply, *Desalination, Arid lands, Nuclear powerplants, Irrigation, Costs, Industrial plants, Agronomic crops, Fertilizers, Deserts, Land use, Human population, Water shortage.
Identifiers: *Gaza-Sinai sea coast region.

In the Gaza-Sinai sea coast region any industrial or agricultural development is dependent upon an adequate water supply. The prospects for such development and its effect on water resources are discussed. About forty-five percent of the arable land in the Gaza is presently irrigated, mainly from wells. Some water is available from winter rains. The alternative to these water resources is desalination which would require sizeable amounts of power. The use of nuclear power and oil and gas is evaluated. One alternative is to construct a large agro-industrial complex that would not only produce and utilize desalinated water, but which could contribute low cost chemical fertilizers for use in the area. The obvious disadvantage of such a project is the cost. Two desalination plants capable of producing 250 million gallons of fresh water per day would require an investment of at least $400 million. In addition to the cost of water, the types of crops that might be grown and the industries constructed are discussed. (Jamail-Arizona)
W77-02115

WATER SUPPLY AND SEWAGE TREATMENT IN ARID AREAS.
For primary bibliographic entry see Field 5D.
W77-02173

DESALINATION TO PLAY A MAJOR PART IN MIDDLE EAST WATER SUPPLY.
Water Services, Vol. 80, No. 960, p 92,94, February, 1976.

Descriptors: *Desalination, *Desalination plants, *Desalination apparatus, *Water purification, *Desalination processes, Potable water, Water supply, Water resources, *Water treatment, Water quality, Distillation, Water quality, Water softening, Water sources, Water resources development, Water supply development, Water demand.
Identifiers: *Middle East, Qatar.

With Middle East countries devoting a large part of their oil revenues to building modern industrial infrastructures and improving living standards generally, the demand for pure water is growing rapidly. Scarcity of water in the Middle East is likely to lead to reliance upon desalination plants to meet water demands, and desalination as a possible water source for drinking and industrial needs is discussed. In the area, most desalination plants work by distillating sea water. The design of plants being constructed in Qatar is discussed. Each of the plants will be capable of producing four million and five million gallons of fresh water per day depending upon the method utilized. The operation of the plants, which are part of an extensive program of development and industrialization being conducted by the government of Qatar, is discussed. (Jamail-Arizona)
W77-02175

DESERT FOOD FACTORIES,
Arizona Univ., Tucson. Environmental Research Lab.
For primary bibliographic entry see Field 3C.
W77-02176

THE INFLUENCE OF THE RAW WATER CONDITIONING ON THE WORKING DATA OF A REVERSE OSMOSIS PLANT TO PRODUCE ULTRA-PURE WATER (EINFLUSS DER ROHWASSERKONDITIONIERUNG AUF BETRIEBSDATEN EINER UMKEHROSMOSE-ANLAGE ZU REINSTWASSERERZEUGUNG),
For primary bibliographic entry see Field 5D.
W77-02355

ELECTRODE KINETICS OF ANTIMONY IN ACIDIC CHLORIDE SOLUTIONS,
California Univ., Los Angeles. School of Engineering and Applied Science.
L. L. Wilkstrom, N. T. Thomas, and K. Nobe.
Electrochemical Science and Technology, Journal of the Electrochemical Society, p 1201-1206, 10 fig, 15 ref. September 1976. (California Water Resources Center Seawater Desalination Project).

Descriptors: *Polarization, Kinetics, Electrodes, Equations, Oxidation-reduction potential.
Identifiers: Electrodissolution, Electrodeposition, *Antimony, Acidic chloride solutions.

The kinetics of the electrode processes of antimony in KC1-HC1 solutions have been investigated. The rest potential of antimony in acidic chloride solutions can be expressed empirically by the equation Ee=0.182-0.06pH+0.020 log (Sb(III)) and is attributed to the redox reaction Sb+2H20=HSb02+3H++3e the empirical rate equations for electrodissolution and electroeduction Ia=Ka(OH-) (Sb(III))-11e2FE/RTand Ic=Kc(H+)2e-FE/RT the rate of electrodeposition of Sb(III) can be expressed as Ic, dep = Kc, dep (H+)(Sb(III))e-FE/2RT a mechanism which is consistent with the experimental results is proposed. (Snyder-California, Davis)
W77-02533

TURBULENT TRANSPORT TO A ROTATION CYLINDER FOR LARGE PRANDTL OR SCHMIDT NUMBERS,
Rice Univ., Houston, Tex. Dept. of Mechanical and Aerospace Engineering and Materials Science.
R. M. Smith, and R. Greif.
Journal of Heat Transfer, p. 594-597, Nov. 1975. (California Water Resources Center Sea Water Desalination Project).

Descriptors: *Mass transfer, *Heat transfer, *Desalination, Equations.
Identifiers: *Prandtl numbers, *Schmidt numbers.

The heat or mass transport to a rotating cylinder is obtained by solving the conservation equations for large Prandtl or Schmidt numbers. A modified mixing length, which includes the effect of centrifugal forces in terms of the Richardson number, is used. Explicit relations are presented for the heat or mass transport and a comparison is made with the experimental data over a range of Prandtl and Schmidt numbers from 190 to 11,000. (Snyder-California, Davis)
W77-02534

DETERMINATION OF SURFACE EQUILIBRIA AND MASS TRANSFER RATES IN A CONCURRENT FLOW BUBBLE COLUMN,
California Univ., Berkeley. Dept. of Chemical Engineering.
E. Valdes-Krieg, J. C. King, and H. H. Sephton.
In: Advances in Interfacial Phenomena, AICHE Symposium Series, Vol. 71, No. 150, p. 46-51, (1976). 4 fig, 21 ref. (California Water Resources Center Sea Water Desalination Project).

Descriptors: *Mass transfer, *Desalination, *Adsorption, Equilibrium, Measurement, Dispersion, Model studies.
Identifiers: *Surface equilibria.

A technique which allows measurement of surface equilibria in a straightforward fashion in concurrent-flow gas-liquid bubble columns is described. The method appears to offer advantages over other procedures currently in use and is also adaptable to situations involving very low collector concentrations incapable of supporting a foam. The technique also enables simultaneous determination of effective axial dispersivities and mass transfer coefficients to the surface on the basis of an axial dispersion model. (Snyder-California, Davis)
W77-02535

3B. Water Yield Improvement

THE ARIZONA WATER PLAN: A STATUS REPORT,
Arizona Water Commission, Phoenix.
For primary bibliographic entry see Field 4D.
W77-02104

MANAGING THE SOUTHWESTERN NATIONAL FORESTS FOR WATER AND RELATED RESOURCES,
Forest Service (USDA), Washington, D. C.
For primary bibliographic entry see Field 4A.
W77-02107

WATERSHED MANAGEMENT'S EFFECTS ON MANY RESOURCES,
Arizona Univ., Tucson. School of Renewable Natural Resources.
P. F. Ffolliott, and D. B. Thorud.
In: 19th Annual Arizona Watershed Symposium Proceedings, Report No. 7, p 39-42, September 1975. 11 ref.

Descriptors: *Watershed management, *Arizona, *Water yield improvement, *Resources development, Vegetation effects, Coniferous forests, Ponderosa Pine Trees, Forest watersheds, Forest management, Chaparral, Soil-water-plant relationships, Wildlife management, Canopy, Livestock.

An overview is presented of water yield improvement research as evaluated in terms of multiple use management and emphasizing conifer forests, ponderosa pine forests. and chaparral shrub zones. Results suggest that vegetation management has the potential for increased water yield, while maintaining or enhancing the production and use of associated natural resources and minimizing the destruction of on-site soil resources. The three vegetation zones highlighted are believed to have the greatest potentials for increasing water yield through vegetation management. Tests on those vegetation zones are described, with experimental watersheds in different areas showing improved water yield. Clearing or thinning of vegetation overstories in conifer and ponderosa pine forests to improve water yield is also consistent with primary wood harvesting activities. Herbage production is generally increased, with a resultant increase in potential livestock carrying capacities. Wildlife response in experimental watersheds suggests an improved habitat by opening up dense brush, thereby increasing ease of movement and abundance of forage. Esthetic and soil responses to vegetation management are also discussed. (See also W77-02104) (Jahns-Arizona)
W77-02109

WOODS CANYON--A LARGE SCALE WATERSHED MANAGEMENT EXPERIMENT: AN EXPLANATION AND INTERIM REPORT,
Forest Service (USDA), Flagstaff, Ariz. Rocky Mountain Forest and Range Experiment Station.
D. R. Carder.

In: 19th Annual Arizona Watershed Symposium Proceedings, Report No. 7, p 43-46. September, 1975. 1 tab, 8 ref.

Descriptors: *Watershed management, *Forest management, *Water yield improvement, *Demonstration watersheds, *Arizona, Vegetation effects, Surface runoff, Land use, Wildlife management, Pine trees.
Identifiers: *Woods Canyon(Ariz), *Beaver Creek(Ariz).

Progress is reported on the watershed management experiment being conducted at Woods Canyon, a 10,700 acre watershed located within the Beaver Creek watershed south of Flagstaff, Arizona. Studies were undertaken to learn whether modification of vegetation could produce more water in the Salt-Verde River Basin; ponderosa pine and pinyon-juniper vegetation in the Beaver Creek watershed account for 60% of the total Basin runoff. Woods Canyon and a control site are described and the objectives of the experiment outlined along with a land use plan being formulated. Major management alternatives considered for the pine lands in the Woods Planning Unit are discussed. One alternative emphasizes primary wood production on an even flow basis over the entire area. The second alternative stresses equally the production of timber and the maintenance and improvement of big game habitat. The third involves retaining natural conditions and esthetics while preserving commodity production on some of the more productive soils. The fourth alternative stresses water yield and livestock forage. Potential effects on water yield for each approach are analyzed; alternative four promises the greatest yield of both forage and water. (See also W77-02104) (Jahns-Arizona)
W77-02110

CHAPARRAL MANAGEMENT: ITS POTENTIAL--ITS PROBLEMS--ITS FUTURE,
Forest Service (USDA), Tempe, Ariz. Rocky Mountain Forest and Range Experiment Station.
J. H. Dieterich.
In: 19th Annual Arizona Watershed Symposium Proceedings, Report No. 7, p 47-51, September, 1975. 1 fig, 15 ref.

Descriptors: *Chaparral, *Range management, *Southwest U.S., *Arizona, *Water yield improvement, Land clearing, Burning, Land use, Environmental effects, Chemcontrol, Herbicides.
Identifiers: *Chaparral management.

Various approaches are discussed to chaparral management in the Southwest, especially in Arizona. The amount of land meeting criteria for active management must be ascertained. Other considerations include environmental effects, potentials for increasing water yield, forage production and recreational opportunities, and methods for reducing fire suppression costs in chaparral areas. Conversion of 21% of the chaparral could increase Arizona's yearly water supply by an average of 150,000 acre feet (2% of the total). Other possible effects of conversion are described, including increased erosion. Chaparral can be controlled or eliminated mechanically by rootplowing, prescribed burning, and with herbicides; the costs and effectiveness of each method and some management alternatives are analyzed. Management by protection is still the main approach but is inadequate; one problem is the lack of financing for large-scale conversion and maintenance operations. Another problem involves finding an effective and environmentally acceptable chemical for initial treatment and maintenance on chaparral watersheds. More intensive management in the future is likely, and continued research will be necessary. Some possible directions of research are discussed. (See also W77-02104) (Jahns-Arizona)
W77-02111

DROUGHT HAZARD IN THE UNITED STATES: A RESEARCH ASSESSMENT,
Colorado Univ., Boulder. Inst. of Behavioral Science.
R. A. Warrick, P. B. Trainer, E. J. Baker, and W. Brinkman.
NSF Program on Technology, Environment and Man, Monograph NSF-RA-E-75-004, 1975. 199 p, 41 fig, 11 tab, 171 ref, 1 append

Descriptors: *Droughts, *Water shortage, *Water demand, *Water conservation, Agriculture, Water resources, Water reuse, Desalination, Precipitation(Atmospheric), Rainfall, Moisture deficit, Water supply, Irrigation, Climatology, Meteorology, Weather forecasting.
Identifiers: *Agricultural drought, *Urban drought.

An overview of droughts, their causes and effects, is presented. The main focus is drought hazard, determined by the degree to which urban or agricultural demands are over-extended in relation to a highly variable resource, precipitation. Unlike floods and most other geophysical hazards which have a relatively quick onset and short duration, drought is a creeping phenomenon. It is often difficult to ascertain when a drought begins, and when it ends. The question of whether or not an extended dry spell has, in fact, become a drought causes considerable debate among meteorologists, farmers and public officials. The report is divided into two main sections: agricultural drought and urban drought. In each section the factors used to determine drought are discussed. It is concluded that during the past twenty years research emphasis has been on the technical aspects of increasing water supply and on weather modification programs. More research should be conducted on reducing water demand and investigating water reuse programs, desalination, and other water saving devices. (Jamail-Arizona)
W77-02113

EFFECT OF ABSCISIC ACID AT DIFFERENT LEVELS OF SOIL WATER POTENTIAL ON THE TRANSPIRATION OF ZEA MAYS,
Aarhus Univ. (Denmark). Inst. of Plant Physiology.
M. Talha, and P. Larsen.
Physiologia Plantarum, Vol. 37, No. 2, p 104-106, 1976. 1 fig, 11 ref.

Descriptors: *Evapotranspiration control, *Soil water, *Corn(Field), *Moisture stress, *Moisture deficit, Arid lands, *Transpiration, Soil moisture, Soil surfaces, Soil types, Soil water movement, Soil-water-plant relationships, Moisture content, Evapotranspiration, Water loss, *Acids, *Antitranspirants, Water yield improvement.
Identifiers: *Abscisic acid.

In previous attempts to reduce evapotranspiration, chemical antitranspirants in solution have been applied to leaf surfaces. Recently, the capability of abscisic acid in reducing transpiration was demonstrated in a number of plant species but none of these works dealt with the effect of exogenous abscisic acid under conditions of soil moisture deficit, which usually prevail in arid regions. In this study, experiments were conducted to demonstrate the effect of abscisic acid on transpiration at different levels of soil water potential. This relationship upon corn leaves was studied in growth chamber experiments. Preliminary results seem to indicate that abscisic acid could serve as an efficient antitranspirant at certain intermediary soil water potentials. Further research is needed to determine the optimum and most economic concentration of abscisic acid or some other compound as an antitranspirant for various plant species grown in different types of soil with different water potentials. (Jamail-Arizona)
W77-02121

ECOLOGICAL IMPACTS OF SNOWPACK AUGMENTATION IN THE SAN JUAN MOUNTAINS OF COLORADO.
Colorado State Univ., Fort Collins. Coll. of Forestry and Natural Resources.
Report No. CSU-FNR-7052-1, March 1976. 501 p. Steinhoff, H.W., and Ives, J.D., editors. USBR 14-06-D-7052.

Descriptors: *Colorado, *Ecology, *Snowpacks, *Environmental effects, *Weather modification, Mountains, Snow, Environment, Phenology, Geomorphology, Plant growth, Productivity, Small animals(Mammals), Big game, Mammals, Forests, Oak trees, Coniferous trees, Silver iodide, Cloud seeding, Climates, Fescues, Tundra, Alpine, Growth stages.
Identifiers: *San Juan Mountains(Colo).

Effects were studied of varying snowpack on the ecosystems of the San Juan Mountains in Colorado from 1970 to 1975. Initiation of shoot elongation was delayed for plants in the tundra and forests as a result of lower temperatures associated with deeper snowpack. The delay was most apparent for herbaceous species, such as Thurber fescue, whose growth points lay in the immediate zone of lower temperature at ground level. The effect on trees such as Engelmann spruce and quaking aspen was less. The result was a decrease in biomass production of herbaceous species, but not of trees or of Gambel oak, which was found in a zone that became snow clear very early. The delay in beginning of growth persisted through the other stages of the annual cycles of most plants but with less magnitude. There seemed universally a compensation factor which permitted each species to compress its annual cycle in years with a shorter growing season caused by greater depth of snowpack. Phytosociological studies in both forests and tundra showed that plant communities were arranged along a snow clear date gradient. In the forest, Gambel oak gives way to quaking aspen, then to subalpine fir, and finally to Engelmann spruce, as the snow clear date extends later into the year. A noticeable decline in forest populations of deer mice and, to a lesser extent, chipmunks and Microtus spp., followed winters of heavy snowfall. The basic reason was a delay in breeding and in availability of essential foods. No similar effect was found for the pocket gopher or mountain toad. Elk were almost excluded from regions with more than 70 cm of penetrable snow depth, and their travel was noticeably restricted at depths over 40 cm. Movement of elk to higher elevations in spring coincided with the initiation of growth of herbaceous plants rather than directly with the receding snow line, and adequate calving areas were always present. Plant litter in the tundra decreased in areas of deeper snowpack. Local changes in the rate of soil erosion may increase by a factor of 10 as a result of the greater area of bare soil left by the decrease in vegetative cover around snowbanks. No significant increases in silver concentration were detected, because of the small amounts added in cloud seeding and the high background levels of silver in the target area. No deleterious effects of silver iodide have been found at concentrations which could be expected due to cloud seeding. (Humphreys-ISWS)
W77-02160

COMPETITION AND SPACING IN PLANT COMMUNITIES: THE NORTHERN MOHAVE DESERT,
Pennsylvania State Univ., University Park. Dept. of Biology.
For primary bibliographic entry see Field 2I.
W77-02174

SODIUM RELATIONS IN DESERT PLANTS: 5. CATION BALANCE WHEN GROWN IN SOLUTION CULTURE AND IN THE FIELD IN THREE SPECIES OF LYCIUM FROM THE NORTHERN MOJAVE DESERT,
California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology

For primary bibliographic entry see Field 3C.
W77-02178

POTENTIAL FOR DEVELOPMENT OF GROUND WATER AT A TEST SITE NEAR TRURO, MASSACHUSETTS,
Geological Survey, Boston, Mass. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-02306

RECONNAISSANCE OF GROUND-WATER RESOURCES OF THE SQUAXIN ISLAND INDIAN RESERVATION, WASHINGTON,
Geological Survey, Tacoma, Wash. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-02308

ECONOMIC IMPACTS OF WEATHER VARIABILITY,
Missouri Univ., Columbia. Dept. of Atmospheric Science.
J. D. McQuigg.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-252 349, Price codes: A12 in paper copy, A01 in microfiche. Report No. NSF-RA-3-75-125, August 1975. 263 p, 13 fig, 12 tab, 285 ref, 2 append. GI 137218X, ESR73-07752-A01.

Descriptors: *Weather, *Bibliographies, *Abstracts, *Weather modification, Agriculture, Crop response, Crop production, Energy, Forest fires, Public health, Recreation, Construction, Farm equipment, Transportation, Water utilization, Economics, *Economic impact.

Selected interactions between weather and weather-sensitive activities are summarized quantitatively in this compendium designed to assist weather modification project managers. Weather dependent relationships examined are: (1) agriculture, emphasizing wheat, corn, soybeans, grain sorghum, flax, oats, rye, barley, rice, and sugar beets, (2) forest fires, (3) energy demand and alternative energy sources, (4) outdoor activities, including construction, farm machinery, transportation, and recreation, and (5) health and disease effects on humans, farm animals, and crops. Most of the material concerning these interactions deals with direct meteorological impacts; the physical or biological impacts of weather on various enterprises. Also included is a section on the indirect impact of weather, the economics of non-agricultural water usage. These annotated bibliographies are followed by a brief discussion of the use of principal components estimators in multivariate regression, and state wheat yield models. Both an author and subject index are included. (Luedtke-Wisconsin)
W77-02429

INADVERTENT WEATHER MODIFICATION,
Illinois State Water Survey, Urbana.
S. A. Changnon, Jr.
Water Resources Bulletin, Vol. 12, No. 4, p 695-718, August 1976. 7 fig, 6 tab, 52 ref.

Descriptors: *Weather modification, *Cities, *Precipitation(Atmospheric), *Clouds, Weather, Urbanization, Industries, Smoke, Rainfall, Temperature, Humidity, Thunderstorms, Hail, Rain, Urban runoff, Urban hydrology, Climatology, Meteorology.
Identifiers: *Inadvertent weather modification, Urban effects, Visibility.

Man, through modifications of the biosphere, has been affecting the atmosphere on local and regional scales for many years. These alterations have been produced by urban industrial centers, non-urban industrial centers, land use changes in rural areas (deforestation, crop changes, drainage, etc.), and marine areas. Also, a major means whereby man has affected weather has been through his urban environment. More intensively than any other comparable-sized part of the earth's surface, cities are converters of energy and matter, thus directly affecting the heat budget, moisture budget, and exchange of mass in the atmosphere. Consequently, the changes in weather wrought by urbanization encompass all major surface weather conditions. The list of elements or conditions affected includes the contaminants in the air, solar radiation, temperature, visibility, humidity, wind speed and direction, cloudiness, precipitation, atmospheric electricity, severe weather, and certain mesoscale synoptic weather features. This paper specifically addressed the subject of urban-industrial effects on clouds and precipitation in the United States. What has been studied and claimed, as shown by climatic research and limited field experiments, was reviewed first. The scientific controversies related to this subject were treated and then followed by a discussion of the apparent impact and relevance of the changes in precipitation conditions. The summary of the paper identified the key problems. (Sims-ISWS)
W77-02453

SILVER CONTENT OF PRECIPITATION FROM SEEDED AND NONSEEDED FLORIDA CUMULI,
Virginia Univ., Charlottesville. Dept. of Environmental Sciences.
For primary bibliographic entry see Field 2K.
W77-02485

MOLECULAR STUDIES OF THE ICE-FORMING CAPABILITIES OF DIFFERENT SURFACES,
Gidrometeorologicheskii Institut, Leningrad (USSR).
V. G. Morachevsky, and N. A. Dubrovich.
Journal of the Atmospheric Sciences, Vol. 33, No. 10, p 1989-1994, October 1976. 5 fig, 3 tab, 6 ref.

Descriptors: *Nucleation, *Cloud seeding, *Cloud physics, *Ice, Crystals, Chemistry, Silver iodide, Salts, Laboratory tests, Molecular structure, Hail, Clouds, Precipitation(Atmospheric), Weather modification, Meteorology.
Identifiers: *Molecular studies, Hail suppression.

The objective of the present study was to determine the nature of ice-forming capabilities of different chemical compounds whose effectiveness is determined by the character of the forces binding water molecules to the surface of the compound. Adsorption layers of water and ammonia on the salts of silver and lead were studied. Dependence between the surface properties and ice-forming capabilities of the chemical compounds was investigated. Direct molecular structural analysis by infrared spectroscopy and nuclear-magnetic resonance was used in the studies. An active nucleus whose surface stimulates the water-to-ice phase transition for water molecules condensed on it must have a hydrophobic matrix with open structure and centers capable of interacting with water molecules. There seems to be two reasonable ways of artificially modifying a surface with the objective of stimulating the water-to-ice phase transition of condensed water: (1) contamination of the hydrophobic surface with active centers, which can interact with water molecules, or (2) suppression or removal of part of the active centers of a hydrophilic surface. (Sims-ISWS)
W77-02487

3C. Use Of Water Of Impaired Quality

CALIFORNIANS FIGHT SALT WITH WATER.
Irrigation Age, Vol. 9, No. 9, p 14-15, July-August 1975.

Descriptors: Irrigation, Furrow irrigation, Sprinkler irrigation, Salinity, Soils, Saline soils, Salt tolerance.

Confronted with two techniques for reducing salt levels while preparing soil in the Imperial Valley, a Brawley, California farm manager has opted for a combination of both: row irrigation and sprinkler irrigation. But his emphasis is still on sprinkling, which has become popular for germinating a crop. (Skogerboe-Colo St)
W77-02094

UTILIZATION OF NUTRIENTS FROM WASTEWATER BY WHEAT,
Arizona Univ., Tucson. Dept. of Soils, Water and Engineering.
For primary bibliographic entry see Field 5D.
W77-02112

PROSPECTS FOR AN AGRO-INDUSTRIAL COMPLEX ON THE GAZA-SINAI SEA COAST,
State Univ. of New York at Buffalo.
For primary bibliographic entry see Field 3A.
W77-02115

VEGETATION AND SOIL OF SALINE DEPRESSIONS NEAR NAJAF, CENTRAL IRAQ,
Baghdad Univ., (Iraq). Dept. of Botany.
H. Abul-Fatih.
Vegetatio, Vol. 30, No. 2 p 107-115, 1975. 7 fig, 2 tab, 19 ref.

Descriptors: *Saline lakes, *Soil moisture, Plant groupings, Soil types, Salinity, Saline water, Vegetation, Root systems, Deserts, Arid lands, Plant growth, Desert plants, Soil-water-plant relationships.
Identifiers: *Iraq, Iraqi deserts.

The vegetation of saline depressions in the Iraqi deserts has remained almost entirely unexplored. A study was conducted to describe and analyze the saline depression of Bahr-al-Najaf with the following objectives: (1) to distinguish and characterize the plant communities in the area and their distribution, (2) to relate the distribution to selected soil parameters, and (3) to study the physiognomy and root systems of some selected dominant plant species and relate these to soil moisture and salinity. The results are presented. Active plant growth occurs in the summer. Plant distribution is determined by a gradient in salt and water content. Root systems seem strongly correlated to the depth of subsoil moisture. The relationships between plant distribution and salt and water regime are relatively similar to those found in other parts of the Mediterranean region. (Jamail-Arizona)
W77-02116

DESERT FOOD FACTORIES,
Arizona Univ., Tucson. Environmental Research Lab.
C. N. Hodges.
Technology Review, Vol. 77, No. 3, p 32-39, January, 1975. 2 tab.

Descriptors: *Desalination, *Irrigation practices, *Desalination processes, *Vegetable crops, *Crop production, *Greenhouses, Water treatment, Desalination apparatus, Irrigation, Arid lands.
Identifiers: *Abu Dhabi, Waste heat.

New ways need to be found to increase productivity of land available for farming. In Abu Dhabi, agricultural crops are being produced from one of the least arable lands on earth. Desalted water, distilled with waste heat captured from generators, is used to irrigate vegetables inside plastic covered greenhouses. The concept was tested at Puerto Penasco, Mexico. This article explains the process and evaluates the results. Crop production has been high, but costly greenhouse construction

U. OF I. URBANA-CHAMPAIGN

makes the concept practical only for high-value crops. (JamailsArizona)
W77-02176

SODIUM RELATIONS IN DESERT PLANTS: 5. CATION BALANCE WHEN GROWN IN SOLUTION CULTURE AND IN THE FIELD IN THREE SPECIES OF LYCIUM FROM THE NORTHERN MOJAVE DESERT,
California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.
R. T. Ashcroft, and A. Wallace.
Soil Science, Vol. 122, No. 1, p. 48-51, 1976. 4 tab, 6 ref

Descriptors: *Desert plants, *Saline soils, Sodium, Cations, Deserts, Soil types.
Identifiers: *Mojave Desert.

Lycium (wolfberry or desert thorn) is an indicator of saline conditions of the soils of the northern Mojave Desert. Three Lycium species were grown in nutrient solutions with varying sodium levels to determine if the differential responses to cations in the field were reproducible in the greenhouse. In spite of the differences in amounts of cations supplied in the nutrient solutions, the same trend in leaf concentrations as exhibited by field plants held remarkably well for each of the three cations of the three species. Root and leaf analysis indicate that L. andersonii is a poor accumulator of sodium and that the other two Lycium species transport sodium to shoots rather than retain it in roots. A high level of sodium chloride in the nutrient substrate resulted in increased total cations in all three species. There was no relationship in total cation content of the plants with total contents of sodium + potassium + chloride. In whole plants collected from the field, high cation concentrations in leaves were related to differential distribution among plant parts for the three species so that leaf differences were compensated for without differences on the whole plant basis. (Jamail-Arizona)
W77-02178

MOVEMENT OF FERTILIZER AND HERBICIDE THROUGH IRRIGATED SANDS,
Florida Univ., Gainesville. Dept. of Soil Science; and Florida Univ., Gainesville. Inst. of Food and Agriculture.
For primary bibliographic entry see Field 5B
W77-02219

A MODEL FOR THE SIMULTANEOUS PRODUCTION AND DIFFUSION OF FERROUS IRON IN SUBMERGED SOILS,
Agricultural Univ., Wageningen (Netherlands). Dept. of Soils and Fertilizers.
For primary bibliographic entry see Field 2G.
W77-02278

INTERACTIONS OF MICRONUTRIENTS IN BARLEY GROWN ON ZINC-POLLUTED SOILS,
Himachal Pradesh Univ., Palampur (India).
For primary bibliographic entry see Field 2G.
W77-02287

ENVIRONMENTAL IMPLICATIONS OF N FIXATION BY SOYBEANS,
Illinois Univ. at Urbana-Champaign. Dept. of Agronomy.
J. W. Johnson, L. F. Welch, and L. T. Kurtz.
Journal of Environmental Quality, Vol. 4, No. 3, 1975. p 303-306, 3 fig, 2 tab, 7 ref.

Descriptors: *Nitrogen, *Nitrogen fixation, *Soybeans, Crop production, Corn(Field), Crop response, Fertilizers, Fertilization, Nutrients, Nutrient removal.

The objective was to measure inorganic N removal from soil by soybeans grown at different N levels. Nodulating and non-nodulating isolines of 'Clark' soybeans were planted on Flanagan silt loam in 1972 and 1973. Fertilizer rates of 0, 112, 224, and 448 kg N/ha as Ca(NO3)2 enriched with 1% 15N were applied. Symbiotically fixed N decreased from 48 to 10% of the total N in the above-ground plant as applied fertilizer N increased from 0 to 448 kg/ha. Net removals of N by soybean grain were 61, 109, 135, and 149 kg/ha at 0, 112, 224, and 448 kg fertilizer N/ha rates, respectively. Corn grain grown on adjacent plots removed 62, 123, 129, and 133 kg N/ha at fertilizer N rates of 0, 112, 224, and 336 kg/ha, respectively. The study indicates that soybeans are good scavengers for inorganic N in soils.(Skogerboe-Colo St)
W77-02289

NITRATE-NITROGEN REMOVAL FROM SOIL PROFILES BY ALFALFA,
Southwestern Great Plains Research Center, Bushland, Tex.
For primary bibliographic entry see Field 2G.
W77-02290

SALT WATER DOMESTIC WASTE TREATMENT,
Rice Univ., Houston, Tex. Dept. of Environmental Science and Engineering.
For primary bibliographic entry see Field 5D.
W77-02353

SPRAY IRRIGATION SOLVES DISPOSAL PROBLEM,
Van Note-Harvey Associates, Princeton, N.J.
For primary bibliographic entry see Field 5D.
W77-02356

WASTEWATER REUSE-INDUSTRIAL, MUNICIPAL, OR BOTH,
Maintenance Engineering Corp., Houston, Tex.
For primary bibliographic entry see Field 5D.
W77-02358

SOYBEAN YIELD RESPONSES AND ASSIMILATION OF ZN AND CD FROM SEWAGE SLUDGE-AMENDED SOIL,
Illinois Univ. at Urbana-Champaign. Dept. of Agronomy
For primary bibliographic entry see Field 5C.
W77-02377

CROP RESPONSE TO TANK TRUCK APPLICATION OF LIQUID SLUDGE,
Ball State Univ., Muncie, Ind. Dept. of Natural Resources.
For primary bibliographic entry see Field 5C.
W77-02390

A STUDY OF BACTERIAL AEROSOLS AT A WASTEWATER IRRIGATION SITE,
Army Medical Bioengineering Research and Development Lab., Frederick, Md.
For primary bibliographic entry see Field 5A.
W77-02392

MODELING REACTIONS AND TRANSPORT OF POTASSIUM IN SOILS,
Florida Univ., Gainesville. Dept. of Soil Science.
For primary bibliographic entry see Field 5B.
W77-02529

3D. Conservation In Domestic and Municipal Use

UTILITY OF URBAN RUNOFF MODELING, (PROCEEDINGS OF A SPECIAL SESSION, SPRING ANNUAL MEETING, AMERICAN GEOPHYSICAL UNION, WASHINGTON, D.C. 14 APRIL 1976.
American Society of Civil Engineers, New York.
For primary bibliographic entry see Field 2A.
W77-02076

ANALYSIS OF STORM WATER SEEPAGE BASINS IN PENINSULAR FLORIDA,
Florida Univ., Gainesville. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W77-02083

DROUGHT HAZARD IN THE UNITED STATES: A RESEARCH ASSESSMENT,
Colorado Univ., Boulder. Inst. of Behavioral Science.
For primary bibliographic entry see Field 3B.
W77-02113

RATIONAL WATER PRICING IN THE TUCSON BASIN,
Arizona Univ., Tucson. Coll. of Business and Public Administration.
For primary bibliographic entry see Field 6D.
W77-02170

PRICING URBAN WATER,
Arizona Univ., Tucson. Coll. of Business and Public Administration.
For primary bibliographic entry see Field 6D.
W77-02171

CHARACTERIZATION OF URBAN RUNOFF,
Rutgers - The State Univ., New Brunswick, N.J. Water Resources Research Inst.
For primary bibliographic entry see Field 5B.
W77-02180

PHYSICAL AND ECONOMIC EFFECTS ON THE LOCAL AGRICULTURAL ECONOMY OF WATER TRANSFER TO CITIES,
Economic Research Service, Fort Collins, Colo. Natural Resource Economics Div.
For primary bibliographic entry see Field 6B.
W77-02190

FLOW DATA COLLECTION FOR INFILTRATION-INFLOW ANALYSIS,
Whitman, Requardt and Associates, Baltimore, Md.
For primary bibliographic entry see Field 5D.
W77-02334

SALT WATER DOMESTIC WASTE TREATMENT,
Rice Univ., Houston, Tex. Dept. of Environmental Science and Engineering.
For primary bibliographic entry see Field 5D.
W77-02353

MARYLAND HIGHWAY DRAINAGE STUDY: VOLUME III - A LINKED SYSTEM MODEL FOR THE SYNTHESIS OF HYDROGRAPHS IN URBAN AREAS,
Maryland Univ., College Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4C.
W77-02492

3E. Conservation In Industry

MATHEMATICAL MODELS FOR USE IN PLANNING REGIONAL WATER RESOURCES AND ENERGY SYSTEMS,
Illinois Univ. at Urbana-Champaign. Dept. of Civil Engineering.

For primary bibliographic entry see Field 6A.
W77-02079

DROUGHT HAZARD IN THE UNITED STATES: A RESEARCH ASSESSMENT,
Colorado Univ., Boulder. Inst. of Behavioral Science.
For primary bibliographic entry see Field 3B.
W77-02113

WATER REQUIREMENTS FOR SOLAR ENERGY,
Arizona State Univ., Tempe.
C. E. Backus, and M. L. Brown.
American Water Works Association, Journal, Vol. 68, No. 7, p 366-369, July, 1976. 8 fig, 13 ref.

Descriptors: *Water requirements, *Available water, *Energy conversion, *Solar radiation, *Water utilization, *Water allocation(Policy), Water management(Applied), Electric power, Powerplants, Water, Natural resources, Competing uses, Consumptive use, Evaporation, Water supply, Runoff, Cooling water, Energy.
Identifiers: *Solar energy.

Like many of the systems that convert traditional energy sources into more useful forms, some that convert direct solar energy require water, usually for cooling. The use of several forms of energy for converting solar energy and their water requirements are discussed and evaluated. Of the many proposed applications for solar energy use, electric power generation is the one expected to require the largest amounts of water. Some thermal plants also require significant amounts of water, while the photovoltaic plants require no water. The inter-dependence of insolation and water availability is a factor in determining the type of solar power plant that is feasible in a given area. Maps compare the mean annual runoff and groundwater supplies with the mean daily total or direct insolation, when there is nothing such as dust or water vapor between the sun and the collector. Cooling method and mechanisms are evaluated and projections regarding the use of solar energy are given. (Jamail-Arizona)
W77-02122

A COMPUTERIZED INFORMATION SYSTEM ON THE IMPACTS OF COAL-FIRED ENERGY DEVELOPMENT IN THE SOUTHWEST,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 6G.
W77-02163

THE COPPER INDUSTRY AND WATER IN ARIZONA,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
L. A. Snow.
Master of Science Thesis, 1976. 81 p, 8 fig, 16 tab, 42 ref, 1 append.

Descriptors: *Copper, *Overdraft, *Industrial water, *Mine water, *Water demand, Water utilization, Competing uses, Water policy, Water allocation(Policy), Water resources, Water conservation, Water requirements, Water users, Groundwater availability, Water management(Applied), Groundwater mining, Groundwater resources, *Arizona, Mining, Groundwater.

Two of Arizona's most important natural resources are copper and water. The water requirements of the copper industry in Arizona are discussed and evaluated. Copper deposits are located in areas with little or no surface water, which has resulted in the exploitation of groundwater resources. As a result, many areas of the state are experiencing groundwater overdraft. The copper industry's water requirements are expected to increase over the next 10 to 20 years and the impact on the state's water resource is discussed. In order to deal with this situation, conservation measures must be adopted. The various conservation methods available to reduce the copper industry's new water requirements, a comprehensive water plan, land use regulation strategies, and taxing schemes are presented. Various water saving devices that might be employed by the copper companies are also discussed. The most important measures would be the use of sewage effluents in mining and processing copper. However, for the long run, a comprehensive water plan must be developed at the state level. (Jamail-Arizona)
W77-02166

THE AQUACULTURE OF FRESH WATER PRAWNS, MACROBRACHIUM SPECIES,
Oceanic Inst., Waimanalo, Hawaii.
H. L. Goodwin, and J. A. Hanson.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-246 657, Price codes: A05 in paper copy, A01 in microfiche. Report to NOAA Sea Grant Program, (1975). 95 p, 6 append.

Descriptors: Fish, *Shellfish, *Crustacean, *Freshwater fish, *Aquiculture, Seafood, Aquatic animals, Marine Biology, Aquatic biology, Fisheries, Larvae, Shrimp, Food consumption.
Identifiers: *Prawns, Freshwater prawns, *Malaysian prawns, Giant malaysian prawns, Macrobrachium species, Macrobrachium rosenbergii, Juvenile prawns, Prawn diseases, Prawn culture, Crustacean culture, Prawn fisheries, Shrimp industry.

This publication is a summary of proceedings, augmented by material from other sources, of the Workshop on the Culture of Freshwater Prawns held November 25 and 26, 1974, in St. Petersburg, Florida. This publication has two main purposes: to summarize the state of development, in the United States, of aquaculture of the freshwater prawn, with particular emphasis on the long-legged giant Malaysian prawn, Macrobrachium rosenbergii; and to begin compilation of institutions, companies, and persons engaged in some aspect of prawn research and culture so that communication among persons and organizations with comparable interests may be accelerated. Some of the areas covered in the report are: Malaysian prawn breeding, juvenile prawns, feeding cultured prawns, diseases of freshwater prawns, prawn culture systems, proceeding and marketing of prawns, and the economics of prawn culture. (Katz)
W77-02209

SANITARY-HYGIENIC EVALUATION OF THE RECYCLED WATER SUPPLY ON RAILROADS, (IN RUSSIAN),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Zheleznodorozhnoi Gigieny, Moscow (USSR).
I. P. Ovchinkin, A. M. Lakshin, O. I. Gribanov, V. A. Gaponova, and A. A. Styazhkina.
Gig Sanit 8, p 85-86, 1975.

Descriptors: *Public health, *Recycling, Water supply, Water reuse, *Railroads.

At railroad enterprises, a closed wastewater circulation system can eliminate waste discharge into water bodies. The train washing process is reorganized.--Copyright 1976, Biological Abstracts, Inc.
W77-02241

WASTEWATER REUSE-INDUSTRIAL, MUNICIPAL, OR BOTH,
Maintenance Engineering Corp., Houston, Tex.
For primary bibliographic entry see Field 5D.
W77-02358

ECONOMIC ANALYSIS OF EFFLUENT GUIDELINES: CANE SUGAR REFINING,
Development Planning and Research Associates, Inc., Manhattan, Kans.
For primary bibliographic entry see Field 5D.
W77-02414

DEVELOPMENT DOCUMENT FOR EFFLUENT LIMITATIONS GUIDELINES AND NEW SOURCE PERFORMANCE STANDARDS FOR THE FABRICATED AND RECLAIMED RUBBER SEGMENT OF THE RUBBER PROCESSING POINT SOURCE CATEGORY,
Environmental Protection Agency, Washington, D. C. Effuent Guidelines Div.
For primary bibliographic entry see Field 5D.
W77-02415

ECONOMIC EFFECTS OF ENFORCEMENT VARIABLES ON COMMERCIAL OIL POLLUTION CONTROL STRATEGY,
Naval Postgraduate School, Monterey, Calif.
For primary bibliographic entry see Field 5G.
W77-02418

DEVELOPMENT DOCUMENT FOR EFFLUENT LIMITATIONS GUIDELINES AND NEW SOURCE PERFORMANCE STANDARDS FOR THE FORMULATED FERTILIZER SEGMENT OF THE FERTILIZER MANUFACTURING, POINT SOURCE CATEGORY,
Environmental Protection Agency, Washington, D.C. Effluent Guidelines Div.
For primary bibliographic entry see Field 5D.
W77-02419

DEVELOPMENT DOCUMENT FOR EFFLUENT LIMITATIONS GUIDELINES AND NEW SOURCE PERFORMANCE STANDARDS FOR THE PRIMARY ALUMINUM SMELTING SUBCATEGORY OF THE ALUMINUM SEGMENT OF THE NONFERROUS METALS MANUFACTURING, POINT SOURCE CATEGORY,
Environmental Protection Agency, Washington, D. C. Effluent Guidelines Div.
For primary bibliographic entry see Field 5D.
W77-02421

ECONOMIC ANALYSIS OF EFFLUENT GUIDELINES: THE TEXTILES, FRICTION AND SEALING MATERIALS SEGMENT OF THE ASBESTOS MANUFACTURING INDUSTRY,
Little (Arthur D.), Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5G.
W77-02422

ENERGY DEVELOPMENT: THE ENVIRONMENTAL TRADEOFFS. VOL. 2: RELATIVE ENVIRONMENTAL ASSESSMENT OF METHODS TO INCREASE ENERGY PRODUCTION, CRUDE OIL, PIPELINE QUALITY GAS, AND ELECTRICITY FROM WESTERN COAL,
Stanford Research Inst., Menlo Park, Calif.
For primary bibliographic entry see Field 6G.
W77-02423

INTERNATIONAL SEABED REGIME: INDIA'S INTERESTS AND POLICY OPTIONS,
Lucknow Univ. (India).
For primary bibliographic entry see Field 6E.
W77-02424

ENERGY FROM COAL.
Tetra Tech, Inc., Arlington, Va.
For primary bibliographic entry see Field 6D.
W77-02430

ECONOMIC ANALYSIS OF EFFLUENT GUIDELINES FOR SEAFOOD PROCESSING INDUSTRY: (FISH MEAL, SALMON, BOTTOM FISH, CLAMS, OYSTERS, SARDINES, SCALLOPS, HERRING, ABALONE),
Development Planning and Research Associates, Inc., Manhattan, Kans.
For primary bibliographic entry see Field 5D.
W77-02433

ECONOMIC ANALYSIS OF EFFLUENT GUIDELINES: BEET SUGAR INDUSTRY,
Development Planning and Research Associates, Inc., Manhattan, Kans.
For primary bibliographic entry see Field 5D.
W77-02434

ENVIRONMENTAL ASPECTS OF CHEMICAL USE IN PRINTING OPERATIONS, (SEPTEMBER 22-24, 1975, KING OF PRUSSIA, PA.), CONFERENCE PROCEEDINGS.
Environmental Protection Agency, Washington, D. C. Office of Toxic Substances.
For primary bibliographic entry see Field 5C.
W77-02553

DEVELOPMENT DOCUMENT FOR EFFLUENT LIMITATIONS GUIDELINES AND NEW SOURCE PERFORMANCE STANDARDS FOR THE PLYWOOD, HARDBOARD AND WOOD PRESERVING SEGMENT OF THE TIMBER PRODUCTS PROCESSING POINT SOURCE CATEGORY,
Environmental Protection Agency, Washington, D. C. Effluent Guidelines Div.
For primary bibliographic entry see Field 5G.
W77-02554

HYPERFILTRATION FOR RENOVATION OF TEXTILE FINISHING PLANT WASTEWATER,
La France Industries, S. C.
For primary bibliographic entry see Field 5D.
W77-02557

CHLORIDES IN THE KRAFT RECOVERY SYSTEM. I. CHLORIDES IN THE RECOVERY BOILER, AND A MECHANISM FOR CHLORIDE REMOVAL,
Swedish Forest Products Research Lab., Stockholm.
For primary bibliographic entry see Field 5D.
W77-02559

CHLORIDES IN THE KRAFT RECOVERY SYSTEM. II. PROCESS AND EQUIPMENT ASPECTS ON A CLOSED BLEACHED KRAFT MILL,
Finnish Pulp and Paper Research Inst., Helsinki.
For primary bibliographic entry see Field 5D.
W77-02560

EFFLUENT-FREE BLEACHED KRAFT PULP MILL. VIII. BLEACH PLANT RENOVATION AND DESIGN,
Erco Envirotech Ltd., Toronto (Ontario).
For primary bibliographic entry see Field 5D.
W77-02562

3F. Conservation In Agriculture

MAXIMIZING STOMATAL CONTROL AND ROOT SYSTEM TO OPTIMIZE WATER-USE EFFICIENCY IN SOYBEANS,
Kansas Water Resources Research Inst., Manhattan.
I. D. Teare.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 395, Price codes: A05 in paper copy, A01 in microfiche. Completion Report, KWRRI Contribution No. 180, (1976). 100 p. OWRT A-060-KAN(1). 14-34-0001-6017.

Descriptors: *Soybeans, Soil water, *Stomata, *Root systems, *Root distribution, Root development, Soil profiles, Sorghum, Soil moisture, Irrigation practices, Plant growth.
Identifiers: Available soil water, Soil water potential, Leaf water potential, Leaf area index, Physiological stage, Dry matter, Stomatal resistance, *Nitrate reductase activity.

Soybean and grain sorghum roots have been studied in relation to rate of root extention, rooting depth, dry matter distribution in the soil profile, soil water use and flux, and physiological stages of development under irrigated and nonirrigated conditions. Soybean roots reached a depth of 160 cm in a barrier-free soil 15 1/2 weeks after planting date in both irrigated and nonirrigated treatments. A greater proportion of nonirrigated soybean roots were at deeper depths than the irrigated sorghum roots. Sorghum roots reach maximum depth (150 cm) much quicker than soybean roots (7 weeks after planting date). Soil moisture inventories showed that sorghum conserves soil moisture early in the season, a phenomenon related to stomatal resistance. Soybeans, on the other hand, transpire more water and extract more water from the soil than grain sorghum. The greater negative flux of water in soybeans late in the season helps explain their using more water than sorghum. Stomatal resistance values of 8 to 10 sec/cm occur after nitrate reductase activity decreases and before photosynthesis is reduced, so stomatal resistance may be useful for scheduling irrigations in soybeans and sorghum.
W77-02077

DRIP IRRIGATION FILTRATION PROBLEMS AND RESEARCH,
Controlled Water Emission Systems, El Cajon, Calif.
D. L. Wilson.
Sprinkler Irrigation Association, 1975 Annual Technical Conference Proceedings, Hyatt-Regency Hotel, Atlanta, Georgia, February 23-25, 1975. p 51-57, 4 ref.

Descriptors: Irrigation water, Irrigation, Irrigation systems, Filtration, Filters, Water quality, *Irrigation practices.
Identifiers: *Drip irrigation, *Trickle Irrigation.

One of the major concerns in drip irrigation is filtration. Proper filtration makes the difference between an effective drip installation and one that is ineffective with many problems and poor efficiency. The drip filtration problem is examined and defined. Existing equipment and processes to treat the filtration requirement are reviewed. Some of the equipment and processes under development are discussed. (Skogerboe-Colo St)
W77-02090

DRIP IRRIGATION PROGRESS AND PROBLEMS,
California Univ., Parlier. San Joaquin Valley Agricultural Research and Extension Center.
F. K. Aljibury.
In: Sprinkler Irrigation Association, 1975 Annual Technical Conference Proceedings, p 46-47, Hyatt-Regency Hotel, Atlanta, Georgia, February 23-25, 1975.

Descriptors: Irrigation, Irrigation methods, *Irrigation practices, Water conservation.
Identifiers: *Drip irrigation, *Trickle irrigation.

Most drip irrigation installations in California and elsewhere, were made to solve specific problems of water cost, water shortage, soil conditions, labor expense and automated water delivery. The acceptance of this method would have been limited, however, without favorable crop response, production, and favorable costs. Field experience shows that drip irrigation is most advantageous under conditions marginal for other methods of water application. (Skogerboe-Colo St)
W77-02091

THE FUTURE OF AUTOMATED SPRINKLER IRRIGATION SYSTEMS,
Nebraska Univ., Lincoln. Dept. of Agricultural Engineering.
W. E. Splinter.
In: Sprinkler Irrigation Association, 1975 Annual Technical Conference Proceedings, Hyatt-Regency Hotel, Atlanta, Georgia, February 23-25, 1975. p 42-45, 8 ref.

Descriptors: *Sprinkler irrigation, *Automatic control, *Automation, Irrigation, *Irrigation practices, Irrigation efficiency.

Sprinkler irrigation, especially automated forms of sprinkler irrigation, will play a key role in supplying the U.S. with adequate food resources to meet the expanding demands internally and to provide diplomatic and balance-of-trade impact on the international scene. As menial labor to provide shovel work for irrigation becomes increasingly scarce, there will be continued pressures to increase initial investment to automate irrigation. (Skogerboe-Colo St)
W77-02092

IRRIGATION SCHEDULING FOR ENERGY AND WATER CONSERVATION,
Agricultural Research Service, Fort Collins, Colo.
D. F. Heermann.
In: Sprinkler Irrigation Association, 1975 Annual Technical Conference Proceedings, Hyatt-Regency Hotel, Atlanta, Georgia, February 23-25, 1975. p 7-13, 2 fig, 14 ref.

Descriptors: *Water conservation, *Energy, *Scheduling, Sprinkler irrigation, Surface irrigation, *Water conservation.
Identifiers: *Irrigation scheduling.

Many irrigation scheduling schemes have been developed to help the irrigator conserve water and increase yields. The more complex schemes have been shown to conserve considerable amounts of water and energy. However, even the simpler schemes must not be overlooked since they also are good management tools. The benefits of irrigated agriculture in food production will undoubtedly force continued irrigation development throughout the world. (Skogerboe-Colo St)
W77-02093

SPRINKLERS FOR MULTIPLE USE,
M. Hagood.
Irrigation Age, Vol. 9, No. 8, p 11-12, May-June 1975.

Descriptors: *Sprinkler irrigation, Irrigation, Irrigation systems, *Irrigation practices, Fertilization.

Multiple use for full utilization of natural resources has been popular for several years. The multiple use concept for irrigation systems can also be beneficial. Besides nonagricultural uses of sprinkler systems, there are many production aspects which provide potentially better utilization. These include the fertilizer, soil amendment and pesticide application, and climate control. And, although single line systems can be used for purposes other than irrigation, the real dividends come when systems are automated. Solid sets and center pivots, particularly, lend themselves to sophisticated and extra dividend benefits. Multiple purpose systems make it possible to save labor, material, and energy by requiring fewer trips across the field with machinery and by timely chemical application. (Skogerboe-Colo St)
W77-02095

A NEW TECHNIQUE FOR CONSERVING WATER,
A. Humpherys.
Irrigation Age, Vol. 9, No. 7, p 24-25, April 1975.

Descriptors: *Water conservation, Irrigation, Irrigation systems, Irrigation efficiency, *Irrigation practices.

As our knowledge of soils and plants increases and as we learn more about the effects of the field environment and cultural treatments on plant growth and production, we will need to modify present tillage, irrigation, and cultural practices to take advantage of new concepts. A practice getting recent attention consists of using short, frequent irrigations which vary from daily irrigations to irrigating every two or three days. (Skogerboe-Colo St)
W77-02097

COMPUTER IRRIGATION,
Irrigation Journal, Vol. 25, No. 5, p 14-15, September-October 1975.

Descriptors: Irrigation, Scheduling, Computers, *Computer programs, Irrigation practices, Colorado, Crop production.
Identifiers: *Irrigation scheduling.

When to irrigate and how much water to use on crops are decisions which will be made by computer during the current growing season for a test group of cooperating farmers in western and southeastern Colorado. The farmers are part of a computer-controlled irrigation program being conducted by the U. S. Interior Department's Bureau of Reclamation. Program Coordinator Jerry Buchheim is in charge of the project, which is monitored by the bureau's giant Control Data CYBER 74 computer at the Federal Center in Denver. (Skogerboe-Colo St)
W77-02098

OPTIMIZATION OF WATER USE EFFICIENCY UNDER HIGH FREQUENCY IRRIGATION--I. EVAPOTRANSPIRATION AND YIELD RELATIONSHIP,
New Mexico State Univ., University Park. Dept. of Agricultural Engineering.
T. A. Howell, and E. A. Hiler.
Transactions of the American Society of Agricultural Engineers, Vol 18, No 5, p 873-878, September-October 1975. 2 fig, 5 tab, 20 ref.

Descriptors: *Irrigation, *Irrigation efficiency, *Irrigation practices, Irrigation systems, *Evapotranspiration, *Crop response, *Grain sorghum, Irrigation effects, Lysimeters, Moisture stress, Water utilization.
Identifiers: High frequency irrigation, *Drip irrigation, *Trickle irrigation.

An experiment was conducted in 1973 to determine the sensitivity of grain sorghum to water deficits in three selected growth stages under high frequency irrigation. Field lysimeters containing undisturbed soil cores were utilized. Rainfall was removed as a variable by an automatic shelter system. Irrigation treatments consisted of a well-watered control, a variable level of deficit in all three growth periods (SDI treatment), and six additional treatments were irrigated three times per week. Measurements were made to determine irrigation amount, storage depletion, and drainage amount; hence total crop water use could be determined. Three empirical yield models (two multiplicative type and one additive type) were compared to the experimental data. All of these models were quite similar in formulation and represented the experimental data accurately within the range of the data. (See also W76-01083) (Skogerboe-Colo St)
W77-02103

RELATIVE IMPORTANCE OF SOIL RESISTANCE AND PLANT RESISTANCE IN ROOT WATER ABSORPTION,
Agricultural Research Service, Florence, S. C. Southern Region.
For primary bibliographic entry see Field 2D.
W77-02118

EXPERTS CLING TO WATER MYTHS,
M. Muller.
New Scientist, Vol. 70, No. 1006, p 692-693, June 24, 1976.

Descriptors: *Irrigation practices, *Flood irrigation, *Furrow irrigation, *Irrigation systems, *Irrigation efficiency, Irrigation, Irrigation effects, Water policy, Clays, Root zone, Impervious soils, Soil moisture, Soil types, Social values, Agriculture, Rural areas, Planning, *Institutional constrainrs.
Identifiers: *Sudan.

Experts often cite peasants' conservatism as a barrier to rural improvements. However, in the Sudan the conservatism of the experts in the face of adaptability by peasant farmers now jeopardizes the success of a major new irrigation project. The irrigation procedures recommended by irrigation agronomists are compared with the ways in which local farmers have adapted their own traditional irrigation methods. The Gezira irrigation project has been very successful in increasing agricultural production, but there is conflict as to which is the most efficient system of irrigation for this region. The farmers use a system of continuous irrigation. Unsupervised flood irrigation is not highly regarded by experts, but the farmers have adapted their method to the predominant soil type. The clay soil cracks when dry, providing a path for moisture to penetrate the root zone. On saturation, swelling closes the cracks. Overwatering is immediately evidenced by flooding. This method has resulted in reducing the time necessary to irrigate. Even though the local farmers' method of irrigation may be more efficient, the procedures recommended by agricultural experts will be adopted by government planning agencies. (Jamail-Arizona)
W77-02120

EFFECT OF ABSCISIC ACID AT DIFFERENT LEVELS OF SOIL WATER POTENTIAL ON THE TRANSPIRATION OF ZEA MAYS,
Aarhus Univ. (Denmark). Inst. of Plant Physiology.
For primary bibliographic entry see Field 3B.
W77-02121

FLOW CONTROL AND TRANSIENTS IN THE CALIFORNIA AQUEDUCT,
California State Dept. of Water Resources, Sacramento. Div. of Operations and Maintenance.
For primary bibliographic entry see Field 8B.
W77-02136

SEEPAGE FROM TRAPEZOIDAL CANAL IN ANISOTROPIC SOIL,
Indian Inst. of Science, Bangalore. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2G.
W77-02137

WATER MANAGEMENT OF SHORT-SEASON HIGH-DENSITY COTTON,
Arizona Univ., Tucson. Dept. of Soils, Water and Engineering.
R. A. Mohammed.
Master of Science Thesis, 1975. 89 p, 1 fig, 4 tab, 36 ref.

Descriptors: *Water management(Applied), *Cotton, *Soil moisture, *Crop production, Fiber crops, Soils, Soil profiles, Soil water, Irrigation, Irrigation operation and maintenance, Arid lands, Moisture stress, Nitrogen compounds, Fertilizers.

Water management of cotton was studied for three seasons at the University of Arizona Experimental Farm near Tucson. Various irrigation schedules and nitrogen fertilizer application rates were examined, and data were collected on amounts of water applied, yield, boll, and fiber properties, soil nitrate levels and cotton petiole nitrate levels. Two varieties of cotton, Anderson-Clayton 1764 and Deltapine 16, were planted. Deltapine 16 was the only variety planted in 1973 and 1974. The 1972 experiment showed that Deltapine 16 was better suited to the short-season, high-density cotton production system than Anderson-Clayton 1764. The 1973 and 1974 experiments indicated that available soil moisture depletion should not exceed 50-55 percent. Also, criteria (based on available soil moisture) of when to irrigate should not be varied throughout the season. Results suggest that yields can be maintained with early irrigation termination if soil moisture, before irrigation, is kept at a higher level than is the normal practice. Application of 100 pounds of Nitrogen per acre seemed to adequately meet the crop's needs for the season. (Jamail-Arizona)
W77-02164

THE ECONOMICS OF PRESSURIZED IRRIGATION SYSTEMS FOR MATURE CITRUS ORCHARDS IN SOUTHWESTERN ARIZONA,
Arizona Univ., Tucson. Dept. of Agricultural Economics.
P. Wilson, R. W. Fox, and G. S. Willett.
Publication No. 14, 1976. 76 p, 3 fig, 24 tab, 10 ref, 5 append.

Descriptors: *Citrus fruits, *Irrigation efficiency, *Irrigation systems, *Costs, *Irrigation practices, Irrigation districts, Irrigation operation and maintenance, Crops, *Arizona, Irrigation, Irrigated land, Furrow irrigation, Flood irrigation, Water quality, Water costs.
Identifiers: *Pressurized Irrigation Systems.

An economic comparison of alternative irrigation systems for mature citrus orchards in the Wellton Mesa area of Arizona is presented. Investments, operating costs, returns, liquidity and profitability of drip, bubbler and spray systems are analyzed relative to conventional flood irrigation. Data obtained through interviews with citrus producers in the area included crop yields, irrigation techniques utilized, inventory of irrigation facilities and equipment, amount and timing of fertilizer water applied, methods and materials used to control weeds, and labor requirements. Additional information on conventional flood irrigation was obtained from the University of Arizona, the Soil Conservation Service, and the Wellton-Mohawk Irrigation and Drainage District. Results indicate that pressurized irrigation systems are the most efficient: water is delivered to the root area of each tree in the quantity needed to sustain productive growth. The costs of installation and operation of this type of irrigation system are analyzed. (Jamail-Arizona)
W77-02165

RATIONAL WATER PRICING IN THE TUCSON BASIN,
Arizona Univ., Tucson. Coll. of Business and Public Administration.
For primary bibliographic entry see Field 6D.
W77-02170

WATER FLOW IN WHEAT SEEDLINGS AFTER SMALL WATER DEFICITS,
Lund Univ. (Sweden). Dept. of Plant Physiology.
For primary bibliographic entry see Field 2D.
W77-02172

INFLUENCE OF DIFFERENT WATER REGIMES ON OXYGEN DIFFUSION RATES, NUTRIENT UPTAKE, GROWTH AND YIELD OF WHEAT,
Indian Agricultural Research Inst., New Delhi.

A. K. Sharda, and J. P. Gupta.
Annals of Arid Zone, Vol. 14, No. 4, p 373-375, December, 1975. 1 tab.

Descriptors: *Soil moisture, *Moisture stress, *Moisture availability, *Moisture uptake, *Moisture tension, Stress, Tension, *Wheat, Nutrients, Root systems, Crop response, Crop production, Heat conductivity, Soils, Oxygen, Irrigation effects, Soil-Water-Plant Relationships, Aeration.

A pot culture experiment using Delhi sandy loam soil was conducted to study oxygen diffusion, nutrient utilization, growth and yield of wheat as affected by different water regimes. Soil moisture was maintained by irrigating the soil to field capacity. In each pot, four plants were maintained. Fertilizers were applied and periodic observations of height, number of tillers and leaf area were taken during the growth of the crop. Oxygen diffusion rate in the soil was measured. Results indicate an increase in oxygen diffusion rate with increase in soil moisture tension. it can also be inferred that under high moisture regime conditions where there is practically no moisture stress, the conditions are favorable for proper oxygen diffusion, nutrient availability, root and shoot growth and ultimately the yield of the crop. (Jamail-Arizona)
W77-02177

PHYSICAL AND ECONOMIC EFFECTS ON THE LOCAL AGRICULTURAL ECONOMY OF WATER TRANSFER TO CITIES,
Economic Research Service, Fort Collins, Colo. Natural Resource Economics Div.
For primary bibliographic entry see Field 6B.
W77-02190

HE'S AUTOMATING DEAD LEVEL IRRIGATION,
R. Ross.
Irrigation Age, Vol. 9, No. 6, 3 pages, March 1975.

Descriptors: *Surface irrigation, *Furrow irrigation, Irrigation, Irrigation practices, *Irrigation efficiency, *Automation.

Dana Fisher is an enthusiastic innovator. Almost before researchers have put their tentative stamp of approval on an applicable development, it's at work in a big way on Fisher's 6,000-acre Palo Verde Valley farm. It's that type of non-traditionalism that created Fisher's open-ditch system of automated irrigation on dead level fields. Labor and water savings triggered the 160-acre development. (Skogerboe-Colo St)
W77-02195

'TUNING IN' SAVES WATER, BOOSTS YIELDS ON SANDY SOILS,
R. Ross.
Irrigation Age, Vol. 10, No. 3, p 18-20, November-December 1975.

Descriptors: Irrigation, Irrigation efficiency, Irrigation water, Sprinkler irrigation, Scheduling, Water conservation, Sands.
Identifiers: Center pivot irrigation, *Irrigation scheduling.

Any irrigator who can get more yield while using less water is on the right track to higher profits. Bill Condon, Sterling, Colorado rancher/farmer, has been in that desired position for three years. By using an irrigation scheduling program developed by Dr. Dale Heermann, and other Agricultural Research Service colleagues, stationed at Ft. Collins, Colorado, Condon has been able to get consistent yield increases (yields are now between 150 and 160 bushels of corn per acre). Water usage has dropped by about 6 inches per year, and that, says Condon, 'adds a year of life to a center pivot every 5 years because we save about 7 revolutions per year.' (Skogerboe-Colo St)
W77-02196

THE IRRIGATOR'S COUNSELOR,
G. Schleicher.
Irrigation Age, Vol. 10, No. 1, p 20-26, October 1975.

Descriptors: Energy, *Water conservation, *Irrigation, Scheduling, Sprinkler irrigation, *Irrigation efficiency.
Identifiers: Irrigation scheduling.

In summer 1975, over 400 High Plains farmers improved their fertility programs, upgraded their irrigation efficiency, and reduced weed, insect and disease problems without spending a single extra hour in the field, by hiring a professional consulting firm at McCook, Nebraska, to solve their management problems. (Skogerboe-Colo St)
W77-02197

COMPARING THREE MECHANICAL MOVE SPRINKLERS WITH GATED PIPE,
Irrigation Age, Vol. 9, No. 8, p 28-29, May-June 1975.

Descriptors: *Sprinkler irrigation, *Furrow irrigation, Irrigation, Irrigation systems, Pipes, Distribution systems.
Identifiers: *Gated pipe(Irrigation).

Paul Fischbach, University of Nebraska extension irrigationist, spelled out the positive sides of mechanical move sprinklers vs. gated pipe during the Sprinkler Irrigation Association's annual technical conference in Atlanta. (Skogerboe-Colo St)
W77-02198

MAKING SURFACE IRRIGATION WORK WITH AUTOMATION,
R. Alleman.
Irrigation Age, Vol. 9, No. 7, p 38-39, April 1975.

Descriptors: *Surface irrigation, *Furrow irrigation, Irrigation, Water conservation, Irrigation efficiency, Irrigation systems, *Automation.

Nebraska farmers Ed Thieszen and Ted Regier have moved to irrigation systems that cut labor to the minimum, save water, and may increase corn yields. Both have installed automatic surace systems. (Skogerboe-Colo St)
W77-02199

HERBICIDES AND SURFACE IRRIGATION-DO THEY MAKE A TEAM,
G. Schleicher.
Irrigation Age, Vol. 9, No. 5, p 42, February 1975.

Descriptors: *Herbicides, *Surface irrigation, *Furrow irrigation, Irrigation, Irrigation practices, Water pollution control.
Identifiers: *Center pivot irrigation.

Herbigation through center pivot sprinkler irrigation works; that's the consensus of a growing number of irrigation specialists and irrigating farmers who have put the concept to use on a surprising variety of crops. But what about the surface irrigator, the operator who uses gated pipe or an open ditch to deliver water to his fields. Can herbicides be applied as efficiently at ground level as they are through a sprinkler nozzle. The solution to these questions have been the target of several private and university studies in the last year or two. While conclusive results are still somewhat sketchy, it's beginning to look like surface herbigation may eventually take a place in the irrigating farmer's stack of management tools. (Skogerboe-Colo St)
W77-02200

HERBIGATION,
Nebraska Univ., Lincoln. Dept. of Agricultural Engineering.
P. E. Fischbach.
Irrigation Journal, Vol. 25, No. 3, p 22-24, May-June 1975.

Descriptors: *Herbicides, Irrigation, *Irrigation practices, Irrigation systems, Irrigation efficiency, Crop production.
Identifiers: *Herbigation.

Herbigation is the science of applying herbicides through an irrigation system. It's a new way to save food production costs and labor. (Skogerboe-Colo St)
W77-02201

INITIAL RELEASE OF NITROGEN FROM UREAFORM UNDER FIELD CONDITIONS,
Agricultural Research Organization, Bet-Dagan (Israel). Inst. of Soils and Water; Agricultural Research Organization, Bet-Dagan (Israel). Div. of Soil Chemistry and Plant Nutrition.
A. Hadas, U. Kafkafi, and A. Peled.
Soil Science Society of America Proceedings, Vol 39, No. 6, p 1103-1105, November-December 197 3 fig, 2 tab, 10 ref.

Descriptors: *Nitrogen, *Nitrites, Nutrients, Crop response, Fertilizers, Fertilization, Ureas, Mineralogy.
Identifiers: *Bananas, *Ureaform.

The mineralization of ureaform in the soil has been observed during the three weeks following application in a small plot of a banana plantation at two different seasons of the year. In the cooler season ammonium and nitrite accumulated and persisted for 2 weeks. In the warmer season, only ammonium accumulated during 2 days. The rate of mineralization, calculated as a first-order reaction, was greater at the higher temperature, but the rate constants were about 10 times greater in the field than in previous laboratory experiments. The reasons for this are probably changes in microbiological activity and mineralization of nitrogen from sources other than the fertilizer. (Skogerboe-Colo St)
W77-02279

CROP PRODUCTION FUNCTION DETERMINATIONS AS INFLUENCED BY IRRIGATION AND NITROGEN FERTILIZATION USING A CONTINUOUS VARIABLE DESIGN,
North Dakota State Univ., Fargo. Dept. of Soil Science and Biometerology.
J. W. Bauder, R. J. Hanks, and D. W. James.
Soil Science Society of America Proceedings, Vol. 39, No. 6, p 1187-1192, November-December 1975. 3 fig, 6 tab, 16 ref.

Descriptors: *Irrigation, *Irrigation effects, *Nitrogen, *Nutrients, Fertilizers, Fertilization, *Crop production, Soil water, Moisture stress.
Identifiers: *Continuous function designs.

Continuous variable (CVD) and randomized block, split plot (RBSD) designs were used to produce data from which production functions were developed relating corn yield to soil water and nitrogen fertilizer. Data were collected at Logan, Utah in 1972 and Farmington, Utah in 1973. The CVD water and nitrogen treatments, respectively, were sequential or continuous and not randomized. The design is compact but has some statistical uncertainty. The CVD had 7 or 8 soil water (W) levels and 22 or 24 nitrogen (N) levels compared to 4 W and 5 N levels for RBSD. The area used for the RBSD was 3 or 4x that used for the CVD. The data analyzed for the CVD led to the same conclusions as the analysis of the RBSD. The production function (regression equation) at Logan was different from that at Farmington except when comparisons were made on a relative basis. (Skogerboe-Colo St)
W77-02281

EFFECT OF LIME ON BORON TRANSPORT TO AND UPTAKE BY COTTON,
Arkansas Univ., Fayetteville. Dept. of Agronomy.
H. D. Scott, S. D. Beasley, and L. F. Thompson.
Soil Science Society of America Proceedings, Vol. 39, No. 6, p 1116-1121, November-December 1975. 3 fig, 5 tab, 22 ref.

Descriptors: *Boron, *Cotton, *Crop response, Soils, Soil investigations, Soil chemistry, Moisture stress, Adsorption, Diffusivity, *Lime, *Absorption, Path of pollutants.

Deficiencies of Boron have occurred in cotton grown in coarse textured soils during periods of moisture stress and in those soils which have been recently limed. These B deficiencies have generally been attributed to a decrease in soil B availability to cotton. As a result a greenhouse experiment was conducted to study (1) the amounts of adsorption and diffusivity rates of B in two silt loams and (2) B adsorption by cotton grown in pots. Addition of lime increased B adsorption by both a Taloka silt loam and a Calloway silt loam. Maximum B adsorption occurred on the seventh day after its addition but did not differ appreciably from the one day equilibration time. The adsorption data could not be accurately described by the Langmuir adsorption equation. (Skogerboe-Colo St)
W77-02282

SOIL CHANGES RESULTING FROM CROPPING,
Agricultural Research Service, Manhattan, Kans.
For primary bibliographic entry see Field 2G.
W77-02284

EFFECT OF DEGREE OF SOIL PROFILE DISRUPTION ON PLANT GROWTH AND SOIL WATER EXTRACTION,
Academy of Agricultural Sciences, Sofia (Bulgaria). Inst. of Soil Science.
For primary bibliographic entry see Field 2G.
W77-02286

NUTRIENT DILUTION-ANTAGONISM EFFECTS IN CORN AND SNAP BEANS IN RELATION TO RATE AND SOURCE OF APPLIED POTASSIUM,
National Fertilizer Development Center, Muscle Shoals, Ala.
G. L. Terman, S. E. Allen, and B. N. Bradford.
Soil Science Society of America Proceedings, Vol. 39, No. 4, p 680-685, July-August 1975. 6 fig, 2 tab, 12 ref.

Descriptors: *Corn(Field), *Beans, *Crop response, *Potassium, *Nutrients, Fertilization, Crop production, Fertilizers.

Greenhouse pot experiments were conducted to compare responses of corn and snap beans to 0 to 1,600 mg of K/pot as KNO3, KCl, and K2SO4 on K-deficient soils (3 kg of soil/pot). Marked responses were obtained to applied K, which were similar among sources, except for a toxic salt effect of 1,600 mg of K as KCl. Marked reciprocal K-N, K-P, K-Ca, and K-Mg relationships with yield response to rates of applied K were attributed to both dilution and ion antagonism. (Skogerboe-Colo St)
W77-02288

ECONOMIC IMPACTS OF WEATHER VARIABILITY,
Missouri Univ., Columbia. Dept. of Atmospheric Science.
For primary bibliographic entry see Field 3B.
W77-02429

IRRIGATING SOYBEANS WITH LIMITED WATER,
Kansas Agricultural Experiment Station, Manhattan. Evapotranspiration Lab.
L. R. Stone, W. L. Powers, and C. D. Nickell.
Kansas Water Resources Research Institute Contribution Number 158. Kansas Agricultural Experiment Station Bulletin, Keeping Up With Research 18, March 1975. 3 p, 1 fig, 4 tab. OWRT A-069-KAN(2). 14-31-0001-5016.

Descriptors: Growth stage, *Soybeans, *Irrigation practices, *Soil moisture, Crop production, Soil water.
Identifiers: *Soybean lodging, *Limited irrigation, Soil-moisture depletion.

During the past three years soybean yields and lodging as influenced by irrigation amount and time were evaluated. The results should help irrigators who want to use less water because of limited water supply, limited pumping capacity, limited time, increased cost of fuel for pumping, or other reasons. The 3 years of data indicate that full-season irrigation does not increase soybean yields, but increases lodging over soybeans irrigated only during pod formation and filling (bean development). Limited in-season irrigation is most practical in soils with large water-holding capacity and nothing to restrict extensive root development; and if a moderate to large amount of soil water is stored before planting.
W77-02523

DRIP IRRIGATION INCREASES YIELD AND SIZE OF 'SUNRICH' NECTARINES,
Florida Univ., Gainesville. Dept. of Fruit Crops.
J. F. Bartholic, and D. W. Buchanan.
Proceedings of the Florida State Horticultural Society, Vol 88, p 509-511, 1975. 1 fig, 1 tab, 10 ref. OWRT B-014-FLA(7). 14-31-0001-3868.

Descriptors: Evapotranspiration, Evapotranspiration control, Energy budget, Oranges, Water balance, Crop production, Orchards, Fruit crops.
Identifiers: Drip irrigation.

A 'Sunrich' nectarine orchard was established in 1972 with drip irrigation on 2/3 of the orchard with 1 emitter per tree and permanent overhead irrigation on the remaining 1/3. Drip irrigation required about 1/3 less water during the first 3 years of the experiment. Tree growth during this period was similar; however, root studies show there was a difference in rooting patterns between drip and overhead irrigation. Roots were concentrated between 6 and 24 inches in the soil under drip irrigation and in the top ft. where overhead irrigation supplemented rainfall. Even with only 3 gal per day applied to trees during the 1975 fruiting season, there were significant increases in yield and fruit size with drip irrigation. (Morgan-Florida)
W77-02541

SPRAY IRRIGATION OF WASTE WATER ON CITRUS GROVES,
Agricultural Research and Education Center, Lake Alfred, Fla.
For primary bibliographic entry see Field 5D.
W77-02544

A BIOECONOMIC SIMULATION ANALYSIS OF REGULATING GROUNDWATER IRRIGATION,
Oklahoma State Univ., Stillwater. Dept. of Agricultural Economics.
H. P. Mapp, Jr., and V. R. Eidman.
American Journal of Agricultural Economics, Vol. 58, No. 3, p 391-402, August 1976. 1 fig, 6 tab, 25 ref. OWRT A-057-OKLA(1). 14-01-0001-1539.

Descriptors: *Irrigation, *Crops, *Yield equations, *Simulation analysis, *Stochastic processes, *Regulation, *Groundwater, Economics, Water allocation(Policy), Soil water, Soil moisture, Pumping, Decision making, Farm, Income, Water policy, Evaluation, Systems analysis, Great Plains.
Identifiers: *Ogallala Formation(Great Plains), *Bioeconomic model, Dryland crops, Marginal private costs, Marginal social costs.

Developed is a firm-level bioeconomic simulation model capable of stochastically determining yields for the major dryland and irrigated crops in the central basin of the Ogallala Formation as a function of soil moisture and atmospheric stress during critical stages of plant development. The Ogallala Formation is a major unconsolidated aquifer providing irrigation water for much of the Great Plains. The model presented is used to evaluate three methods of regulating groundwater irrigation: no restriction; a quantity limitation; and a graduated tax per unit above the quantity limitation. Results differ for poor and adequate water situations but indicate the potential value of an educational program on timing of irrigation application to maximize net farm income. (Bell-Cornell)
W77-02549

EVAPOTRANSPIRATION MODEL TESTED FOR SOYBEAN AND SORGHUM,
Kansas State Univ., Manhattan. Dept. of Agronomy.
For primary bibliographic entry see Field 2D.
W77-02550

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

A MODEL FOR PREDICTING FLOOD HAZARDS DUE TO SPECIFIC LAND-USE PRACTICES,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W77-02078

WHAT'S IN THE FUTURE FOR SPRINKLER IRRIGATION,
Nebraska Univ., Lincoln. Dept. of Agricultural Engineering.
W. E. Splinter.
Irrigation Age, Vol. 9, No. 6, p 26, p 30, March 1975.

Descriptors: Irrigation, *Sprinkler irrigation, *Irrigation practices, Irrigation systems.

Man's recognition of the need for water for plants appears nearly as old as agriculture. Ancient works in Asia Minor indicate that quite complex irrigation systems were developed several thousand years ago. Many of the ancient systems are still in use. The use of external energy to move water appeared first with the use of wind powered pumping plants. Since its inception irrigation has required high inputs of effort and management. (Skogerboe-Colo St)
W77-02096

ARIZONA'S FROZEN ASSETS: SNOWPACK MANAGEMENT,
Arizona Univ., Tucson. School of Renewable Natural Resources.
For primary bibliographic entry see Field 2C.
W77-02106

U. S. DEPT. OF I. URBANA-CHAMPAIGN

MANAGING THE SOUTHWESTERN NATIONAL FORESTS FOR WATER AND RELATED RESOURCES,
Forest Service (USDA), Washington, D. C.
J. R. McGuire.
19th Annual Arizona Watershed Symposium Proceedings, Report No. 7, p 35-36, September 1975.

Descriptors: *National forest, *Southwest U.S., *Forest management, *Watershed management, *Water yield improvement, *Water quality standards, *Herbicides, Natural resources.

National forest management in the Southwest is discussed with regard to legal guidelines, policy-making and research on water and related resources of forest land. Two basic principles of National Forest Management issued in the 1950's are still applicable: protection of the watershed by stabilizing the soil and thereby preserving and enhancing water quality; and management of the area to improve water yields. Multiple use management accounts for timber production, recreation, grazing and wildlife as priorities equal to water yield. Watershed management studies and their benefits are briefly discussed; in Arizona alone, $10 million in public and private funds has been spent on such projects. Problems described include the meeting of water quality standards, the cost of increasing water yields, and the impact of chemical herbicide restrictions on water yield improvement programs. Future watershed management studies and programs are discussed. (See also W77-02104) (Jahns-Arizona)
W77-02107

ARIZONA'S FROZEN ASSETS: VOLUMETRIC FORECASTS FROM SNOWPACK,
Arizona Water Commission, Phoenix.
For primary bibliographic entry see Field 2C.
W77-02108

DROUGHT HAZARD IN THE UNITED STATES: A RESEARCH ASSESSMENT,
Colorado Univ., Boulder. Inst. of Behavioral Science.
For primary bibliographic entry see Field 3B.
W77-02113

LAW, HYDROLOGY, AND SURFACE-WATER SUPPLY IN THE UPPER COLORADO RIVER BASIN,
Lamont-Doherty Geological Observatory, Palisades, N. Y.
For primary bibliographic entry see Field 6E.
W77-02119

AN ANALYSIS OF THE EFFECTS OF PARAMETER UNCERTAINTY IN DETERMINISTIC HYDROLOGIC MODELS,
International Inst. for Applied Systems Analysis, Laxenburg (Austria).
For primary bibliographic entry see Field 2A.
W77-02125

OPERATION OF A RESERVOIR COLLECTING WATER FROM A SMALL WATERSHED,
Technion - Israel Inst. of Tech., Haifa. Lowdermilk Faculty of Agricultural Engineering.
N. Buras, M. H. Diskin, and S. Zamir.
Water Resources Research, Vol. 12, No. 5, p 866-872, October 1976. 5 fig, 6 tab, 3 ref.

Descriptors: *Reservoir operation, *Optimization, *Economic efficiency, Watersheds(Basins), Operations research, Synthetic hydrology, Storm runoff, Decision making, Irrigation, Reservoir storage, Pumping, Costs, Benefits, Equations, *Small watersheds.
Identifiers: *Operating policy, *Linear control curves, Operating targets, *Cost minimization, Dalton Reservoir(Israel), Economic criteria.

Best operation policies, linear and nonlinear, were developed for a small reservoir in which storm runoff water might be augmented by pumping water from another source. These policies were aimed at a full reservoie at the beginning of the yearly irrigation season and, indirectly, utilized more efficiently the existing neighboring pumping installations, which are usually idle in winter. The operating policies are expressed as time-dependent functions indicating the level of the reservoir which would ensure its being full at the end of the rainy season with a given probability. When these policies were tested with a synthetic hydrologic series of 45 years, it appeared that the cost of operating the reservoir was inversely proportional to the daily amount of water pumped into it from external sources. (Bell-Cornell)
W77-02126

FLOW CONTROL AND TRANSIENTS IN THE CALIFORNIA AQUEDUCT,
California State Dept. of Water Resources, Sacramento. Div. of Operations and Maintenance.
For primary bibliographic entry see Field 8B.
W77-02136

THE USE OF LANDSAT DCS AND IMAGERY IN RESERVOIR MANAGEMENT AND OPERATION,
Corps of Engineers, Waltham, Mass. New England Div.
S. Cooper.
Report NASA CR-146320, Type II Progress Report No. 3, December 1, 1975. 7 p, 1 fig. NASA 22510.

Descriptors: *Remote sensing, *Maine, Equipment, *Instrumentation, Satellites(Artificial), Projects, Data processing, Water resources, Reservoirs, *Reservoir operation, Snowpacks, Computers.
Identifiers: *LANDSAT, *St John River(Maine).

On 19-25 September, two snow pillows were interfaced to DCP's in the Saint John River basin area of northern Maine to obtain real time information on the water equivalent of the snowpack. NED's direct LANDSAT DCS ground receive facility or Local User Terminal (LUT) was completely installed as of 15 September. A period of initial testing ensued, and the system was fully operational by mid-December. For the first three weeks, antenna pointing angles were transferred to the tracking equipment via paper tape, but within a short time, this was circumvented by a direct interface to out NOVA mini-computer. At the end of the reporting period, the system was operable in an automatic mode and could be left unattended overnight and during weekends. (Sims-ISWS)
W77-02151

FOURTH SEMIANNUAL INTERAGENCY BRIEFING, FEBRUARY 1975, WASHINGTON, D.C.,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Environmental Effects Lab.
For primary bibliographic entry see Field 8G.
W77-02158

FLOW RECESSION IN THE EPHEMERAL STREAM,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 2E.
W77-02162

APPLICATIONS OF ERTS PRODUCTS IN RANGE AND WATER MANAGEMENT PROBLEMS, SAHELIAN ZONE: MALI, UPPER VOLTA AND NIGER,
Geological Survey, Denver, Colo.
M. E. Cooley, and R. M. Turner.
Open-file report (West Africa Investigations), 1975. 68 p, 17 fig, 3 tab, 12 ref.

Descriptors: *Satellites(Artificial), *Remote sensing, *Range management, *Water management(Applied), *Africa, Environmental control, Environmental effects, Public Health, Mapping.
Identifiers: Satellite imagery, *ERTS(LANDSAT), *Sahel, *Mali, *Upper Volta, *Niger.

A field investigation was conducted during April and May of 1974 to evaluate the application of Earth Resources Technology Satellites (ERTS, now called LANDSATS) imagery to range and water management problems in the Sahelian zone. ERTS imagery was studied, then evaluated by inspecting ground features in trips by car, light plane and commercial jet airlines. The study indicates such imagery can provide general overviews of regions or entire countries and is viable in areas where ground surveys are inadequate or nonexistent. They also allow repetitive inventorying and monitoring of transient environmental changes on the earth's surface, and aid in solving special problems of disease control and resource development. Applications include riverblindness and tsetse fly control, bush-burning evaluation, distinction of arable from nonarable land, and the analysis of accelerated erosion problems. Mapping and imagery selection are discussed, and the limitations imposed by environmental conditions are described. (Jahns-Arizona)
W77-02167

WATER POLLUTION INVESTIGATION: DULUTH-SUPERIOR AREA.
Midwest Research Inst., Kansas City, Mo.
For primary bibliographic entry see Field 5B.
W77-02202

MAINE RIVERS BIBLIOGRAPHY- A USER'S MANUAL,
Research Inst. of the Gulf of Maine, Portland
For primary bibliographic entry see Field 10C.
W77-02224

SOME ASPECTS OF MUNICIPAL OVERFLOW RESERVOIR MONITORING, (IN SWEDISH),
Uppsala Kommun (Sweden). Halsovard Forvaltning.
For primary bibliographic entry see Field 5A.
W77-02228

SOME HYGIENIC PROBLEMS RELATED TO THE USE OF HERBICIDES OF THE 2,4 DICHLOROPHENOXYACETIC ACID GROUP (IN RUSSIAN),
Tomsk Meditsinskii Institut (USSR).
For primary bibliographic entry see Field 5G.
W77-02231

PARROT'S-FEATHER (MYRIOPHYLLUM AQUATICUM (VELL.) VERDC.), AN AGGRESSIVE WATER WEED IN PORTUGAL, (IN PORTUGUESE),
Estacao Agronomica National, Oeiras (Portugal).
For primary bibliographic entry see Field 5G.
W77-02247

SANITARY-HYGIENIC ASPECTS OF THE USE OF NEW PREPARATIONS FOR CONTROLLING SEEPAGE IN WATER BODIES, (IN RUSSIAN),
Kiev Research Inst. of General Communal Hygiene (USSR).
R. V. Petrov, and V. I. Vorobets.
Gig Sanit 5, p 105-106, (1975).

Descriptors: *Seepage control, *Linings, *Canal linings, Public health, Rodents, *Industrial waste, Oil wastes, Detergents, Acids, Alcohols, Water pollution

Full-scale and experimental investigations showed that the distillation residues of the production of synthetic aliphatic acids and alcohols, which are wastes of petroleum refineries and detergent-producing factories, can be used in quantities up to 5 tons/ha for constructing waterproof facings on the beds of water bodies and irrigation canals. The preparations in this dose did not have toxic effects on rats in a 6-mo. experiment.--Copyright 1976, Biological Abstracts, Inc.
W77-02269

EFFECTS OF WATERHYACINTH COVER ON WATER CHEMISTRY, PHYTOPLANKTON, AND FISH IN PONDS,
Auburn Univ., Ala. Dept. of Fisheries and Allied Aquacultures.
For primary bibliographic entry see Field 5G.
W77-02291

PROJECT DEVELOPMENT AND DATA PROGRAMS FOR ASSESSING THE QUALITY OF THE WILLAMETTE RIVER, OREGON,
Geological Survey, Portland, Oreg. Water Resources Div.
For primary bibliographic entry see Field 2E.
W77-02301

SELECTION OF STREAMFLOW AND RESERVOIR-RELEASE MODELS FOR RIVER-QUALTIY ASSESSMENT,
Geological Survey, Jackson, Miss.; and Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 2A.
W77-02302

EFFECTS OF WATER-MANAGEMENT PRACTICES ON THE FLOW OF THE SOUTH PLATTE RIVER, COLORADO,
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-02303

PREDICTED AND OBSERVED TEMPERATURE AND WATER-QUALITY CHANGES OF LAKES AND RESERVOIRS,
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 2H.
W77-02304

SIMULATED EFFECTS OF THE PROPOSED TENNESSEE COLONY RESERVOIR ON GROUND-WATER CONDITIONS IN THE CARRIZO-WILCOX AQUIFER AND TRINITY RIVER ALLUVIUM, TEXAS,
Geological Survey, Austin, Tex. Water Resources Div.
S. Garza.
Reprint from International Symposium on the Hydrological Characteristics of River Basins and the Effects on these Characteristics of Better Water Management, held in Tokyo, Japan, December 1975: International Association of Hydrological Sciences Publication No. 117, p 597-605, 1975. 4 fig, 9 ref.

Descriptors: *Baseline studies, *Pre-impoundment, *Computer models, *Steady flow, Effects, Aquifers, Downstream, Reservoirs, Forecasting, Groundwater, Aquifer characteristics, *Texas.
Identifiers: *Trinity River flood plain(Tex), *Carrizo-Wilcox aquifer(Tex).

Digital-computer models were used to simulate the steady-state effects of the proposed Tennessee Colony Dam and Reservoir on ground-water conditions in the Carrizo-Wilcox aquifer and in the Trinity River alluvium downstream from the reservoir. The proposed structure, located south of Dallas on the Trinity River flood plain, is part of a multipurpose development by the U.S. Army Corps of Engineers on the Trinity River and tributaries between the Dallas-Fort Worth area and the Texas Gulf Coast. Preliminary analyses indicate that the potentiometric surface in the Carrizo-Wilcox aquifer in the outcrop area would be near land surface only in low-lying areas near the reservoir shoreline, where rises of 30 feet to more than 40 feet would occur in some areas. Lesser rises would occur in the area where the aquifer is artesian, but they would spread out over greater distances; rises of 5 feet would occur at distances of 20 miles from the dam. Rises in aquifer head in the Trinity River alluvium would extend to not more than 5 miles downstream from the proposed dam. Without remedial action, the altitude of the potentiometric surface would be above or near land surface in most of the area within about 2 miles downstream from the dam. (Woodard-USGS)
W77-02305

SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70: PART 1. NORTH ATLANTIC SLOPE BASINS--VOLUME 3. BASINS FROM MARYLAND TO YORK RIVER.
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-02307

DEPTH TO WATER TABLE, RECHARGE AREAS, DRAINAGE BASINS, AND RELIEF OF DUVAL COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-02311

TRANSVERSE MIXING IN NATURAL CHANNELS,
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 2E.
W77-02313

EFFECTS OF WATER MANAGEMENT ON FRESH-WATER DISCHARGE TO BISCAYNE BAY,
Geological Survey, Tallahassee, Fla. Water Resources Div.
T. J. Buchanan, and H. Klein.
Paper presented at Biscayne Bay Symposium I, held in Florida, April 2-3, 1976, University of Miami Sea Grant Special Report No 5, p 271-277, 1976. 4 fig, 7 ref.

Descriptors: *Watershed management, *Flood control, *Flow control, *Water quality, *Surface-groundwater relationships, Florida, Canals, Saline water intrusion, Bays, Water level fluctuations, *Florida.
Identifiers: *Biscayne Bay(Fla).

Prior to development in southeast Florida, fresh water discharged to Biscayne Bay consisted of flow through natural drainageways, overland flow and coastal underseepage from the Biscayne aquifer. Present day discharge to the bay is seasonal, from controlled canals and seepage. The fresh-water flow to Biscayne Bay has been significantly reduced in quantity and in time due to extensive flood and water control measures instituted as a result of the extensive flooding in 1947. As a result of these flood and water control measures, surface flows could be fully controlled in the Everglades by the end of 1962. Because of the controls fresh-water levels in south Dade now recede twice as fast as before. Thus, since 1953 annual fresh-water flow to the bay has been reduced by about 20 percent and the time period for storm runoff has also been reduced. (Woodard-USGS)
W77-02314

HYDROLOGY OF LAKE COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-02316

WATER RESOURCES INFORMATION NEEDS FOR THE SUWANNEE RIVER WATER MANAGEMENT DISTRICT,
Geological Survey, Tallahassee, Fla. Water Resources Div.
K. Vanlier, S. D. Leach, C. W. Leve, and J. C. Rosenau.
Suwannee River Water Management District, White Springs, Information Circular No 1, 1975. 65 p, 29 fig, 12 tab, 13 ref.

Descriptors: *Watershed management, *Water resources, *Water districts, *Florida, *Hydrologic data, Data collections, Planning, Network design, Water supply, Water demand, Water utilization, Water quality, Surface waters, Groundwater.
Identifiers: *Suwannee River basin(Fla), Data base applications.

The report summarizes the availability of hydrologic data, portrays future data needs and the networks and programs that will have to be implemented to obtain data not already available for the Suwannee River basin in Florida. The existing data base consists of extensive geologic and topographic mapping and water resource investigations in 7 of the 15 counties of the District. It also consists of large blocks of water-use data, streamflow and ground-water-level records and lake- and reservoir-stage records. Water-quality records are available for 17 sites. The location of all data-collection points is shown. Data collection techniques are included. (Woodard-USGS)
W77-02318

COMPARISON OF LINEAR SYSTEMS AND FINITE DIFFERENCE FLOW-ROUTING TECHNIQUES,
Geological Survey, Jackson, Miss. Water Resources Div.
For primary bibliographic entry see Field 2E.
W77-02319

FLOW DATA COLLECTION FOR INFILTRATION-INFLOW ANALYSIS,
Whitman, Requardt and Associates, Baltimore, Md.
For primary bibliographic entry see Field 5D.
W77-02334

ECONOMIC AND ENVIRONMENTAL IMPACTS OF AGRICULTURAL LAND DRAINAGE IN ONTARIO,
York Univ., Downsview (Ontario). Dept. of Geography.
W. C. Found, A. R. Hill, and E. S. Spence.
Journal of Soil and Water Conservation, Vol. 31, No. 1, p. 20-24, 1976. 2 fig, 1 tab, 10 ref.

Descriptors: *Environmental effects, *Economic impact, *Drainage systems, *Canada, Ditches, Drainage programs, Agriculture, Agricultural engineering, Drainage effects, Cost-benefit ratio, Cost-benefit analysis, Economic justification.
Identifiers: *Ontario(Canada).

Economic and environmental impacts of government-assisted agricultural land drainage in seven Ontario townships, which are representative of the full range of drainage conditions in the province, were investigated. Thirty-seven drainage projects completed between 1965 and 1970 were included. Emphasis was on the local impacts as experienced at the level of the individual farm and municipal outlet drains, and benefit-cost ratios were derived for each project. It is concluded that on the whole, the drainage projects have generated benefits for agriculture at the local level without creating

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undue environmental damage. However, a number of drainage projects had a very low benefit-cost ratio, and much variation existed even within a given township. This variation was accounted for by the identification of seven variables: (1) agricultural productivity of the environment, (2) installation of field tile drainage, (3) special hydrological conditions, (4) local initiative with respect to use of the drains, (5) type of drainage project, (6) quality of the drain engineering, and, (7) weather conditions since completion of the projects. The only serious environmental losses reported pretained to loss of permanent wetlands and the channelization of streams. However, the cumulative effect of a number of drainage projects, each of which has only minor effects on the environment, may have serious hydrological consequences. (Luedtke-Wisconsin)
W77-02425

THE FLOOD DISASTER PROTECTION ACT OF 1973,
Pennsylvania State Univ., University Park. Dept. of Business Law.
For primary bibliographic entry see Field 6F.
W77-02427

MINNESOTA WATER RESOURCES BOARD AND WATERSHED DISTRICTS.
Minnesota Water Resources Board, St. Paul.
For primary bibliographic entry see Field 6E.
W77-02428

MARYLAND HIGHWAY DRAINAGE STUDY: VOLUME I - SUMMARY REPORT,
Maryland Univ., College Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4C.
W77-02490

SKYLAB IMAGERY: APPLICATION TO RESERVOIR MANAGEMENT IN NEW ENGLAND,
Cold Regions Research and Engineering Lab., Hanover, N.H. Research Div.
H. L. McKim, L. W. Gatto, C. J. Merry, and R. K. Haugen.
Available from the National Technical Information Service, Springfield, VA 22161 as N76-17464, Price codes: A04 in paper copy, A01 in microfiche. Report NASA-CR-144514, September 1975. 59 p, 11 fig, 12 tab, 20 ref, 2 append. NASA T-4646B.

Descriptors: *Remote sensing, *Reservoir operation, *Land use, *Runoff, *New England, Satellites(Artificial), Aerial photography, Surveys, Photography, Reservoirs, Estuaries, Rivers, Classification, Land classification, Watersheds(Basins), Water resources, Water resources development.
Identifiers: *Skylab, *LANDSAT, Imagery.

The purpose of this investigation was to determine the utility of Skylab S190A and B photography for providing reservoir management information in New England. LANDSAT, Skylab S190A and S190B and RB-57/RC8 images were reduced to a common scale of 1:63,360 for a mapping base to demonstrate the extent to which the imagery could be utilized in the preparation of reconnaissance land use maps. These types of maps are required in the baseline evaluation of areas for reservoir management planning and for future environmental planning activities, i.e., permit evaluation and impact statements. Visual interpretations were accomplished on original NASA color infrared S190A/B and RB-57/RC8 transparencies and a LANDSAT false color print. The relative utility of the multiband imagery in identifying and quantifying hydrologic factors was evaluated. The land use statistics for two small watersheds were determined, and the effects of these land use factors were appraised for possible contribution to runoff potential. Significant findings of this investigation were as follows: (1) S190B imagery is superior to the LANDSAT MSS imagery for land use mapping and is as useful for category I and II land use mapping as the high altitude RC8 imagery; (2) for evaluating volume runoff potentials, the S190B imagery was found to be as useful as the RB-57/RC8 imagery; and (3) where regional hydrologic surveys and land use mapping are critical requirements in urban planning and natural resource development, the S190B imagery is of great potential value. (Sims-ISWS)
W77-02499

EVALUATION OF THE FEASIBILITY OF USING THE DATA COLLECTION SYSTEM TO OPERATE A NETWORK OF HYDROLOGICAL AND CLIMATO-LOGICAL STATIONS AT SITES REMOTE FROM NORMAL COMMUNICATION LINKS,
Department of Natural Resources, Quebec.
For primary bibliographic entry see Field 7B.
W77-02501

ELASTIC-PLASTIC STABILITY ANALYSIS OF MINE-WASTE EMBANKMENTS,
Bureau of Mines, Spokane, Wash. Spokane Mining Research Center.
For primary bibliographic entry see Field 8D.
W77-02502

RETRANSMISSION OF HYDROMETRIC DATA IN CANADA,
Department of the Environment, Ottawa (Ontario). Applied Hydrology Div.
For primary bibliographic entry see Field 7C.
W77-02506

USE OF RADAR INFORMATION IN DETERMINING FLASH FLOOD POTENTIAL,
National Weather Service, Garden City, N. Y. Eastern Region.
For primary bibliographic entry see Field 2B.
W77-02509

USE OF PLANT PATHOGENS FOR BIOREGULATION OF AQUATIC MACROPHYTES,
Florida Univ., Gainesville. Dept. of Plant Pathology.
For primary bibliographic entry see Field 5G.
W77-02514

PRESSING CHARACTERISTICS OF WATERHYACINTH,
Florida Univ., Gainesville. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2I.
W77-02527

EVALUATION OF CERCOSPORA RODMANII AS A BIOLOGICAL CONTROL OF WATERHYACINTHS,
Florida Univ., Gainesville. Dept. of Plant Pathology.
For primary bibliographic entry see Field 5G.
W77-02528

CERCOSPORA RODMANII, A NEW PATHOGEN OF WATER HYACINTH WITH BIOLOGICAL CONTROL POTENTIAL,
Florida Univ., Gainesville. Dept. of Plant Pathology.
For primary bibliographic entry see Field 5G.
W77-02540

MYCOLEPTODISCUS TERRESTRIS LEAF SPOT ON WATERHYACINTH,
Florida Univ., Gainesville. Dept. of Plant Pathology.
For primary bibliographic entry see Field 5G.
W77-02543

4B. Groundwater Management

ANALYSIS OF STORM WATER SEEPAG BASINS IN PENINSULAR FLORIDA,
Florida Univ., Gainesville. Dept. of Civil E gineering.
For primary bibliographic entry see Field 5G.
W77-02083

GEOPHYSICAL STUDY OF THE WATERBEAR ING STRATA IN BITTERROOT VALLE MONTANA,
Montana Univ., Missoula. Dept of Geology.
For primary bibliographic entry see Field 2F.
W77-02085

THE ARIZONA WATER PLAN: A STATUS RI PORT,
Arizona Water Commission, Phoenix.
For primary bibliographic entry see Field 4D.
W77-02104

SEEPAGE FROM TRAPEZOIDAL CANAL I ANISOTROPIC SOIL,
Indian Inst. of Science, Bangalore. Dept. of Civ Engineering.
For primary bibliographic entry see Field 2G.
W77-02137

INVESTIGATION OF TWO-REGIME WEL FLOW,
University Coll. of Swansea (Wales).
P. Huyakorn, and C. R. Dudgeon.
Journal of the Hydraulics Division, Americ Society of Civil Engineers, Vol 102, No HY Proceedings Paper 12383, p 1149-1165, Septemb 1976. 6 fig, 35 ref, 3 append.

Descriptors: *Aquifers, *Base flow, *Water well Water yield, Finite element analysis, Mathema cal models, Equations, Hydraulic gradien Velocity, Hydraulic conductivity, Darcys la Reynolds number, Numerical analysis, Hydraul models, Particle size, Pump testing
Identifiers: *Two-regime flow, Galerkin method,

A mathematical method and a Galerkin finite el ment formulation were presented for steady tw regime flow toward wells in confined and unco fined aquifers. The model was verified by compa ing the finite element solutions of typical cas with pumping test results obtained from laborato experiments. A new type curve method for dete mining the in-situ hydraulic characteristics of selected aquifer material was described. It w shown that the method leads to good agreeme between the theory and experiments and that t in-situ values may be quite different from the co responding values obtained from permeabili tests on a sample of the aquifer. (Visocky-ISWS)
W77-02142

NUMERICAL SOLUTION OF BOUSSINES EQUATION,
Punjab Agricultural University, Ludhiana (India Dept. of Soil and Water Engineering.
For primary bibliographic entry see Field 2F.
W77-02143

PREDICTION OF MOUND GEOMETRY UNDE RECHARGE BASINS,
San Jose State Univ., Calif.
For primary bibliographic entry see Field 2F.
W77-02144

MINIMIZING COSTS IN WELL FIELD DESIG IN RELATION TO AQUIFER MODELS,
Arizona Univ., Tucson. Dept. of Hydrology ar Water Resources
For primary bibliographic entry see Field 8B.
W77-02161

THE DETERMINATION OF SEASONAL VARIATIONS IN GROUNDWATER RECHARGE BY DEUTERIUM AND OXYGEN-18 ANALYSIS FOR THE TUCSON BASIN, ARIZONA,
Arizona Univ., Tucson. Dept. of Geosciences.
For primary bibliographic entry see Field 2F.
W77-02169

TRANSIENT MOVEMENT OF WATER AND SOLUTES IN UNSATURATED SOIL SYSTEMS, PHASE II,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 2G.
W77-02189

HYDROGEOLOGIC CHARACTERISTICS OF THE MISSOURI RIVER VALLEY FLOOD PLAIN,
Missouri Univ., Columbia. Dept. of Geology.
For primary bibliographic entry see Field 2F.
W77-02194

WATER QUALITY IMPACTS OF URANIUM MINING AND MILLING ACTIVITIES IN THE GRANTS MINERAL BELT, NEW MEXICO,
Environmental Protection Agency, Dallas, Tex. Region VI.
For primary bibliographic entry see Field 5G.
W77-02208

PROCEEDINGS: 8TH ANNUAL WATER RESOURCES SEMINAR GROUNDWATER RESOURCES AND DEVELOPMENT NOVEMBER 24 AND 25, 1975.
Minnesota Univ., Minneapolis. Water Resources Research Center.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 491, Price codes: A04 in paper copy, A01 in microfiche. WRRC Bulletin 87, May 1976, 45 p. OWRT A-999-MINN(4D).

Descriptors: *Conference, *Groundwater, *Minnesota, Storm water, *Water pollution, Monitoring, Water quality, *Water management(Applied), *Groundwater resources, Regional analysis.

The proceedings of a conference on groundwater, include discussions of topics such as issues and trends in groundwater use, occurrence and quality of groundwater in Minnesota, monitoring of groundwater, stormwater as a potential contaminant, and regional approaches to groundwater management. (Walti-Minnesota)
W77-02223

DESCRIPTIONS AND CHEMICAL ANALYSES FOR SELECTED WELLS IN THE CENTRAL SACRAMENTO VALLEY, CALIFORNIA,
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 2K.
W77-02299

STATUS OF GROUND-WATER MODELING IN THE U.S. GEOLOGICAL SURVEY,
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 2F.
W77-02300

EFFECTS OF WATER-MANAGEMENT PRACTICES ON THE FLOW OF THE SOUTH PLATTE RIVER, COLORADO,
Geological Survey, Lakewood, Colo. Water Resources Div.
R. T. Hurr.

Reprint from International Symposium on the Hydrological Characteristics of River Basins and the Effects on these Characteristics of Better Water Management, held in Tokyo, Japan, December 1975: International Association of Hydrological Sciences Publication No. 117, p 611-618, 1976. 7 fig, 1 ref.

Descriptors: *Water management(Applied), *Surface-groundwater relationships, *Colorado, *Irrigation, Water yield, Water utilization, Water demand, Diversion, Streamflow, Water wells, Groundwater recharge, River basins, Flow control, Model studies.
Identifiers: *South Platte River(Colo).

Water-management practices have affected the various components which make up the flow of the South Platte River in Colorado. Installation of wells and ground-water withdrawals that for many years were individual and unregulated farm-management practices, have reduced the return flow to the river. However, an increase in trans-mountain diversions that resulted in an increased return flow of irrigation water to streams tributary to the South Platte River, occurred simultaneously with a decrease in direct diversions from the river. The effect was little net change in annual streamflow of the South Platte River at the Colorado-Nebraska State line. Design of effective and efficient water-management practices is directly influenced by the interrelations between ground water and surface water, and the effects of imported water on the system. Currently a study of the South Platte River includes the calibration of a computer model of the study area based on observed hydraulic characteristics and interrelations. When calibrated the model can be used to determine future effects of alternative management plans. (Woodard-USGS)
W77-02303

SIMULATED EFFECTS OF THE PROPOSED TENNESSEE COLONY RESERVOIR ON GROUND-WATER CONDITIONS IN THE CARRIZO-WILCOX AQUIFER AND TRINITY RIVER ALLUVIUM, TEXAS,
Geological Survey, Austin, Tex. Water Resources Div.
For primary bibliographic entry see Field 4A.
W77-02305

POTENTIAL FOR DEVELOPMENT OF GROUND WATER AT A TEST SITE NEAR TRURO, MASSACHUSETTS,
Geological Survey, Boston, Mass. Water Resources Div.
J. H. Guswa, and C. J. Londquist.
Open-file report 76-614, 1976. 22 p, 9 fig, 2 tab, 11 ref.

Descriptors: *Groundwater resources, *Groundwater availability, *Aquifer testing, *Saline water-freshwater interfaces, Sea water, *Massachusetts, Coasts, Water supply, Projection, Water resources development.
Identifiers: *Truro(Mass).

An aquifer test was carried out at a possible ground-water development site in Truro, Massachusetts. Average lateral hydraulic conductivity for material in the screened interval of the test well is 216 feet per day. Specific yield of the material at water-table depth is about 0.10. Anisotropy, or ratio of lateral hydraulic conductivity to vertical hydraulic conductivity, is between 1 and 5 for the uppermost 60 feet of saturated material, but is probably much higher at greater depths. Calculation of drawdown after pumping 200 days at 1 million gallons per day indicates lateral intrusion of saline water from the sea would not reach the well and that the area of ground-water contribution would be sufficient to intercept an amount of average annual recharge equal to pumpage. Using the previously determined aquifer constants and the maximum drawdown after 200 days of pumping at 1 million gallons per day, it was determined that a stable upconing adjustment of the fresh water/saline-water interface would occur below the pumping well, and saline water would not reach the well through vertical intrusion. (Woodard-USGS)
W77-02306

RECONNAISSANCE OF GROUND-WATER RESOURCES OF THE SQUAXIN ISLAND INDIAN RESERVATION, WASHINGTON,
Geological Survey, Tacoma, Wash. Water Resources Div.
W. E. Lum, II, and K. L. Walters.
Open-file report 76-382, 1976. 49 p, 10 fig, 3 tab, 11 ref.

Descriptors: *Groundwater resources, *Hydrogeology, *Aquifer characteristics, *Water quality, *Available water, Pumping, Water yield, Water pollution sources, Septic tanks, Biological properties, Saline water intrusion, Chemical analysis, Water supply, *Indian reservations, *Washington.
Identifiers: *Squaxin Island Indian Reservation(Wash).

A supply of fresh ground water for the Squaxin Island Indian Reservation, Washington, exists in saturated deposits underlying the 3.09-square-mile island. Four test wells tapped a water-bearing zone of sand and gravel and had yields ranging from 27 to 170 gpm, with drawdowns of about 5 feet to about 65 feet. Except for high concentrations of iron and manganese (which can be treated and reduced for domestic use), the water quality is good. Conditions for drain-field waste disposal from septic tanks are good in at least the northern two-thirds of the island. The danger of inducing seawater encroachment can be minimized by maintaining pumping levels above sea level, using a network of several wells pumped intermittently into a storage facility, and spacing these wells to spread out the effects of pumping. In the northern half of the island, wells 100 to 200 feet deep may yield 25 to 100 gpm with minimum chances of seawater encroachment. The southern half of the island has a smaller apparent potential for groundwater development and an increased possibility of seawater encroachment. (Woodard-USGS)
W77-02308

DEPTH TO WATER TABLE, RECHARGE AREAS, DRAINAGE BASINS, AND RELIEF OF DUVAL COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-02311

MAPS SHOWING GROUND-WATER CONDITIONS IN THE LOWER BIG CHINO VALLEY AND WILLIAMSON VALLEY AREAS, YAVAPAI AND COCONINO COUNTIES, ARIZONA,
Geological Survey, Tucson, Ariz. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-02312

EFFECTS OF WATER MANAGEMENT ON FRESH-WATER DISCHARGE TO BISCAYNE BAY,
Geological Survey, Tallahassee, Fla. Water Resources Div.
For primary bibliographic entry see Field 4A.
W77-02314

STRATIGRAPHY OF THE PALEOCENE AND LOWER PART OF THE EOCENE IN WESTERN TENNESSEE,
Geological Survey, Nashville, Tenn. Water Resources Div.
For primary bibliographic entry see Field 2F.

W77-02315

HYDROLOGY OF LAKE COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla. Water Resources Div.
D. D. Knochenmus, and G. H. Hughes.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 775, Price codes: A06 in paper copy, A01 in microfiche. Water-Resources Investigations 76-72, August 1976. 100 p, 35 fig, 15 tab, 55 ref.

Descriptors: *Hydrologic budget, *Surface waters, *Groundwater, *Water supply, *Water quality, Water demand, Aquifer characteristics, Groundwater movement, Water yield, Pumping, Groundwater recharge, Streamflow, Lakes, Hydrologic data, Water wells, Chemical analysis, Saline water-freshwater interfaces, *Florida.
Identifiers: *Lake County(Fla).

Lake County includes a 1,150 square-mile area consisting of ridges, uplands, and valleys in central-peninsular Florida. About 32 percent of the county is covered by lakes, swamps, and marshes. Water requirements in 1970 averaged about 54 million gallons per day. About 85 percent of the water was obtained from wells; about 15 percent from lakes. The Floridan aquifer supplies almost all the ground water used in Lake County. Annual recharge to the Floridan aquifer averages about 7 inches over the county; runoff average 8.5 inches. The quality of ground and surface water in Lake County is in general good enough for most uses; however, the poor quality of Floridan-aquifer water in the St. John River Valley probably results from the upward movement of saline water along a fault zone. Surface water in Lake County is usually less mineralized than ground water but is more turbid and colored. (Woodard-USGS)
W77-02316

A BIVARIATE-REGRESSION MODEL FOR ESTIMATING CHEMICAL COMPOSITION OF STREAMFLOW OR GROUNDWATER,
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-02317

GROUND-WATER RESOURCES AND GEOLOGY OF ST. CROIX COUNTY, WISCONSIN,
Geological Survey, Madison, Wis. Water Resources Div.
R. G. Borman.
Wisconsin Geological and Natural History Survey, Madison, Information Circular No 32, July 1976. 30 p, 15 fig, 1 plate, 2 tab, 17 ref.

Descriptors: *Groundwater resources, *Aquifer characteristics, *Water supply, *Water quality, *Hydrogeology, Water wells, Pumping, Water yield, Water users, Water demand, Available water, Chemical analysis, Hydrologic data, *Wisconsin.
Identifiers: *St. Croix County(Wis).

The increasing need for good-quality ground water in St. Croix, County, Wisconsin, caused by a steadily increasing population, can be met from the sand-and-gravel and sandstone aquifer. As much as 15 gpm can be obtained from wells almost everywhere in the county. Yields of more than 1,000 gpm are available from glacial deposits and alluvium where there is sufficient thickness of saturated sand and gravel. The sandstone aquifer underlies the entire county and is more than 1,000 feet thick in the southwest near River Falls. In St. Croix County the sandstone aquifer is all bedrock younger than Precambrian age and includes, in ascending order, from oldest to youngest, sandstones of Cambrian age (in ascending order, the Mount Simon, Eau Claire, Galesville, and Franconia Sandstones, and the Trempealeau Formation); and the Prairie du Chien Group, St. Peter Sandstone, and Galena-Platteville unit (Platteville and Decorah Formations and Galena Dolomite, undifferentiated), all of Ordovician age. This aquifer is capable of yielding more than 1,000 gpm to wells in much of the county and is the principal source of municipal water. The water from both aquifers is hard to very hard, having a median hardness between 180 and 190 mg/liter. Iron and manganese are locally present with combined total exceeding 0.3 mg/liter. Nitrate is a minor problem in both aquifers with median concentrations more than 10 mg/liter. About 3.83 mgd of ground water was pumped in the county in 1974, of which 94 percent was from the sandstone aquifer. About 44 percent of the total water pumped was for industrial and commercial use, 42 percent for residential use, and 14 percent for irrigation, institutional, and municipal use. (Woodard-USGS)
W77-02321

PRELIMINARY SELECTION OF STORM-WATER BASINS SUITABLE FOR INFILTRATION OF RECLAIMED WATER IN NASSAU COUNTY, LONG ISLAND, NEW YORK,
Geological Survey, Albany, N Y Water Resources Div.
For primary bibliographic entry see Field 5G
W77-02322

GROUND-WATER HYDROLOGY OF THE COCOA WELL-FIELD AREA, ORANGE COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla Water Resources Div.
C. H. Tibbals, and J. M. Frazee, Jr.
Open-file report FL 75-676, January 1976. 67 p, 25 fig, 6 tab, 10 ref.

Descriptors: *Groundwater, *Hydrogeology, *Water wells, *Well data, *Water quality, Water supply, Data collections, Aquifer characteristics, Water levels, Pumping, Saline water-freshwater interfaces, Groundwater recharge, Chemical analysis.
Identifiers: *Orange County(Fla), Cocoa well-field area.

The city of Cocoa, Brevard County, Florida, supplies water for much of central Brevard County including Cape Kennedy and Patrick Air Force Base. The water supply is obtained from a well field in east Orange County. Many of the easternmost wells in that well field yield salty water (chloride concentration greater than 250 milligrams per liter). The interface between the fresh and salty water in the west part of the well field occurs at a depth of about 1,400 feet. An upward hydraulic gradient exists between the the lower (salty) zones and the upper, or pumped zones of the Floridan aquifer in the west part of the well field. Secondary artesian aquifers in the well-field area are relatively high-yielding but are of limited areal extent. However, they are suitable as a source of water for supplemental supply or for artificially recharging the Floridan aquifer. Fresh water was transferred by siphon from a secondary artesian aquifer to the Floridan aquifer at 90 gallons per minute. Artificial recharge and recovery experiments show that it is feasible to retrieve fresh water stored in salty zones of the Floridan aquifer. (Woodard-USGS)
W77-02323

ORGANIC POLLUTANTS CONTRIBUTED TO GROUNDWATER BY A LANDFILL,
Robert S. Kerr Environmental Research Lab., Ada, Okla.
For primary bibliographic entry see Field 5B.
W77-02407

ASSESSING SYNTHETIC AND ADMIXED MATERIALS FOR LINING LANDFILLS,
Matrecon, Inc., Oakland, Calif.
For primary bibliographic entry see Field 5E.
W77-02410

GROUNDWATER AND GROUNDWATER LAW IN MASSACHUSETTS.
Massachusetts Commonwealth Div. of Water Resources, Boston.
Publication No. 8852-95-250, April 1976. 97 p. 21 fig., 9 tab., 57 ref.

Descriptors: *Groundwater resources, *Water pollution, *Water law, *Massachusetts, Groundwater availability, Streamflow, Groundwater recharge, Inter-basin transfers, Surface-groundwater relationships, Water levels, Water table, Water quality, Saline water intrusion, Waste disposal, Coliforms, Septic tanks, Eutrophication, Waste water disposal, Leachates, Deicers, Landfills, Land use, Metals, Common law, Well permits, Regulation, Water rights, Pesticides, Phenols, Judicial decisions, Water allocation(Policy), Sodium chloride.
Identifiers: *Groundwater law, Case studies.

The interrelationship of groundwater and surface water, together with the effects of man's activities on water quality, in Massachusetts, are described followed by case studies on water quantity and quality problems experienced in specific communities. Water quantity examples include: intercommunity competition for water resources, low streamflow related to groundwater withdrawal, need to protect recharge areas, and effect of out-of-basin transfers. Water quality cases include contamination by sodium chloride, by effluent from septic tanks, by leachate from solid waste disposal sites, and by other pollutants such as iron, lead, and pesticides. Current groundwater law in Massachusetts and the economic aspects of groundwater management are also discussed. It is concluded that: (1) consumptive use of groundwater may significantly degrade uses and rights in related surface water systems, (2) unregulated consumption use by private users could threaten to aggravate problems of safe yield, (3) existing common law groundwater rights in Massachusetts can be improved in light of modern knowledge and technology, (4) groundwater pollution is a recurring problem with regional as well as local impacts, resulting from road salt usage, concentrations of septic systems, and municipal and industrial waste disposal practices, and (5) land use practices can significantly impair recharge areas. (Luedtke-Wisconsin)
W77-02437

MARYLAND HIGHWAY DRAINAGE STUDY: VOLUME VI - AN EXPERIMENTAL EXAMINATION OF THE SUBSURFACE DRAINAGE OF ROADWAYS,
Maryland Univ., College Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4C.
W77-02493

TRANSPORT OF MASS AND ENERGY IN POROUS MEDIA DUE TO NATURAL CONVECTION--THE GEOTHERMAL BASIN PROBLEM,
Colorado Univ., Boulder. Dept. of Mechanical Engineering.
D. R. Kassoy.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-247 087, Price codes: A02 in paper copy, A01 in microfiche. Report NSF-RA-N-75-118, March 26, 1975. 21 p, 1 fig, 20 ref. NSF AER74-03429.

Descriptors: *Geothermal studies, *Mass transfer, *Heat transfer, *Porous media, Energy, *Energy transfer, Thermal water, Aquifers, Groundwater, Geology, Model studies, Mathematical models, On-site investigations, Heat flow, Convection, Temperature, Geophysics
Identifiers: *Geothermal fields, Nonisothermal fluids.

The initial 7-month study of physical phenomena occurring in geothermal basins was described. Geological and geophysical field data have been

utilized to develop plausible models of the energy-mass transport systems in geothermal anomalies. The basic describing equations for saturated thermally-active elastic porous media were discussed in the context of modeling physical processes occurring in the geothermal environment. From studies to date the following conclusions have been reached: (1) Deformations in the solid matrix resulting from the application of large liquid pressure gradients may be significant; (2) Two-temperature models will not be necessary for the convective modeling effort due to the very slow flow rates (1 cm/day) involved; (3) Vertical natural convection processes play a significant role in the transport of hot water and energy in undeveloped geothermal regions. Measured output prior to production is very closely estimated by vertical convection study predictions; (4) Locally permeable vertical fault zones may be the significant conduits for heated fluids from depth. Reservoir charging may result when the faulted region intersects relatively permeable horizontal formations; and (5) One of the most critical aspects of making computations and theoretical calculations is to establish models whose geological and mechanical characteristics relate closely to those found in nature. (Sims-ISWS)
W77-02507

A BIOECONOMIC SIMULATION ANALYSIS OF REGULATING GROUNDWATER IRRIGATION,
Oklahoma State Univ., Stillwater. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 3F.
W77-02549

4C. Effects On Water Of Man's Non-Water Activities

ANALYSIS OF STORM WATER SEEPAGE BASINS IN PENINSULAR FLORIDA,
Florida Univ., Gainesville. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W77-02083

WATERSHED MANAGEMENT'S EFFECTS ON MANY RESOURCES,
Arizona Univ., Tucson. School of Renewable Natural Resources.
For primary bibliographic entry see Field 3B.
W77-02109

WOODS CANYON--A LARGE SCALE WATERSHED MANAGEMENT EXPERIMENT: AN EXPLANATION AND INTERIM REPORT,
Forest Service (USDA), Flagstaff, Ariz. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 3B.
W77-02110

CHAPARRAL MANAGEMENT: ITS POTENTIAL--ITS PROBLEMS--ITS FUTURE,
Forest Service (USDA), Tempe, Ariz. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 3B.
W77-02111

AN EVALUATION OF WATER QUALITY INFORMATION: A CASE STUDY OF STREAMS IN METROPOLITAN NEW JERSEY,
Rutgers - The State Univ., New Brunswick, N. J. Dept. of Geography.
For primary bibliographic entry see Field 5A.
W77-02448

INADVERTENT WEATHER MODIFICATION,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 3B.
W77-02453

MARYLAND HIGHWAY DRAINAGE STUDY: VOLUME I - SUMMARY REPORT,
Maryland Univ., College Park. Dept. of Civil Engineering.
R. M. Ragan, and Y. M. Sternberg.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-249 555, Price codes: A06 in paper copy, A01 in microfiche. Report AWO 74-073-046-1, July 1974. 117 p, 33 fig, 2 tab, 16 ref. DOT AWO74-073-046.

Descriptors: *Drainage, *Highways, *Runoff, *Maryland, Drainage practices, Drainage systems, Surface waters, Surface runoff, Subsurface drainage, Urban drainage, Storm drains, Drainage water, Hydrographs, Design storm, Floods, Hydrology, Hydraulics, Drainage engineering, Civil engineering.
Identifiers: *Highway drainage.

The report summarized the major areas covered in the seven detailed volumes comprising the final report of the Maryland Highway Drainage Study. Topics covered include an assessment of current highway drainage practice, a discussion of a design storm technique, and an analysis of surface and subsurface drainage practice. (See also W77-02491 thru W77-02493) (Sims-ISWS)
W77-02490

MARYLAND HIGHWAY DRAINAGE STUDY: VOLUME II - A COMPARISON OF MARYLAND HIGHWAY DRAINAGE PRACTICES WITH THOSE OF OTHER AGENCIES,
Maryland Univ., College Park. Dept. of Civil Engineering.
R. M. Ragan, and Y. M. Sternberg.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-249 556, Price codes: A06 in paper copy, A01 in microfiche. Report AWO74-073-046-2, July 1974. 100 p, 38 fig, 1 tab, 1 append. AWO74-073-046.

Descriptors: *Drainage practices, *Highways, *Maryland, *Runoff, *Drainage, Drainage systems, Subsurface drainage, Surface runoff, Surface waters, Design storm, Storm drains, Urban drainage, Drainage water, Hydrographs, Drainage engineering, Hydrology, Hydraulics, Civil engineering.
Identifiers: *Highway drainage.

One of the key objectives of the Highway Drainage Study was a review of Maryland State Highway Administration drainage practice and a comparison with the approaches followed by other states. In developing this comparison of Maryland State Highway Administration drainage practices with those of other agencies, the Highway Departments of the States of Massachusetts, Connecticut, New York, New Jersey, Delaware, Pennsylvania, Ohio, Virginia, West Virginia, North Carolina, South Carolina, Tennessee, Kentucky, and California were contacted. The report included discussions of some of the key information contained in the drainage manuals of these other states and comparisons with the material included in Interim Hydraulic Criteria for the Design of Highways used by Maryland. Emphasis was placed on the methods used to determine peak discharges because this area shows the greatest variability among the states. (See also W77-02490) (Sims-ISWS)
W77-02491

MARYLAND HIGHWAY DRAINAGE STUDY: VOLUME III - A LINKED SYSTEM MODEL FOR THE SYNTHESIS OF HYDROGRAPHS IN URBAN AREAS,
Maryland Univ., College Park. Dept. of Civil Engineering.
M. J. Root, and R. M. Ragan.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-249 557, Price Codes: A05 in paper copy, A01 in microfiche. Report AW074-073-046-3, July 1974. 84 p, 15 fig, 22 ref, 5 append. DOT AW074-073-046.

Descriptors: *Urban hydrology, *Model studies, *Drainage, Urban drainage, Mathematical models, Computer models, Algorithms, Hydrographs, Rainfall, Runoff, Urban runoff, Computer programs, Drainage practices, Drainage engineering, Design storm, Hydrology, Civil engineering.

The algorithm developed in this report made use of the equations for one-dimensional, unsteady, spatially varied open channel flow and an empirical overland flow mathematical model. The technician or engineer does not need a knowledge of the equations used since he is required only to describe the physical features of the drainage area and to select the hyetograph. The computer automatically develops the hydrograph and returns the value of the discharge at pre-selected time intervals. (See also W77-02490) (Sims-ISWS)
W77-02492

MARYLAND HIGHWAY DRAINAGE STUDY: VOLUME VI - AN EXPERIMENTAL EXAMINATION OF THE SUBSURFACE DRAINAGE OF ROADWAYS,
Maryland Univ., College Park. Dept. of Civil Engineering.
R. S. Taylor, and R. M. Ragan.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-249 558, Price Codes: A05 in paper copy, A01 in microfiche. Report AW074-073-046-6, July 1974. 94 p, 28 fig, 28 tab, 23 ref, 5 append. DOT AW074-073-046.

Descriptors: *Subsurface drainage, *Model studies, *Highways, *Drainage, Drainage systems, Infiltration, Roads, Reviews, Drainage engineering, Groundwater, Storm drains, Drainage waters, Hydrographs, Hydrology, Drainage engineering, Civil engineering.
Identifiers: *Highway drainage, Analog models, Hele-Shaw model.

The report described a series of experiments conducted with an electric analog and Hele-Shaw Model to investigate the steady and unsteady flows in highway base courses. The Hele-Shaw Model was used to study the effects of the general groundwater table and local geometry of the system on the unsteady discharge into a typical ditch section. The geometry used was a fixed trench section without a pipe that modeled the field condition of a drainage ditch backfilled with coarse gravel. Before the experiments were started, a dimensional analysis was performed to isolate the important parameters influencing the discharge. The dimensional analysis was used to control the groundwater elevations set in the ditch and at the upper boundary and the distance from the trench bottom to the impervious layer. A hydrograph was obtained for each set of geometric conditions. The analog model was used to study the pipe-trench, sub-base system with a spatially varied infiltration entering the sub-base through the pavement and shoulder. The diameter of the drain was allowed to vary from four to twelve inches (300%) while the depth of the embedment varied. (See also W77-02490) (Sims-ISWS)
W77-02493

REMOTE SENSING OF EFFECTS OF LAND-USE PRACTICES ON WATER QUALITY,
Kentucky Univ., Lexington. Dept. of Forestry.
For primary bibliographic entry see Field 5A.
W77-02497

U. OF I. URBANA-CHAMPAIGN

SKYLAB IMAGERY: APPLICATION TO RESERVOIR MANAGEMENT IN NEW ENGLAND,
Cold Regions Research and Engineering Lab., Hanover, N.H. Research Div.
For primary bibliographic entry see Field 4A.
W77-02499

SOME EFFECTS OF THE ASWAN HIGH DAM ON WATER AND FISHES OF LAKE BORULLUS, A. R. E.,
Academy of Scientific Research and Technology, Cairo (Egypt).
For primary bibliographic entry see Field 5C.
W77-02512

4D. Watershed Protection

THE ARIZONA WATER PLAN: A STATUS REPORT,
Arizona Water Commission, Phoenix.
T. C. Clark.
In: 19th Annual Arizona Watershed Symposium Proceedings, Report No. 7, p 9-23, Sept. 1975. 2 fig, 7 tab.

Descriptors: *Planning, *Water resources development, *Arizona, *Water supply, *Water utilization, Consumptive use, Groundwater, Groundwater availability, Groundwater recharge, Surface waters, Basins, *Water requirements, *Water demand, *Watershed management, Water yield improvement.

Information is presented from the Arizona Water Commission's report, Inventory of Resources and Uses, which represents Phase I of the Arizona Water Plan. This report compares water supply and use and discusses Arizona's current water problems. Phases II and III will provide technical evaluation of the various forms the water plan might take. The state's total annual surface water diversion from 1968 to 1972 was 3.3 million acre-feet, with Yuma and Maricopa counties accounting for 57 and 29% of the total, respectively. Water resources development is concentrated in 24 basins which contain 89% of the state's population, produce some 60% of the mineral industry revenues and 96% of the crops, and account for 94% of the total water depletion. Substantial groundwater remains in storage, but the annual rate of recharge is limited. Of the water supply, 60% is withdrawn from the ground and 40% from surface supplies. The estimated total dependable supply is 2.8 million acre-feet, of which only 11% is comprised of annual recharge or dependable groundwater supply. Agriculture consumes 89% of the water used. Problems such as the imbalance between supply and consumption are discussed. (See W77-02105 thru W77-02111) (Jahns-Arizona)
W77-02104

ARIZONA'S FROZEN ASSETS: SNOWPACK MANAGEMENT,
Arizona Univ., Tucson. School of Renewable Natural Resources.
For primary bibliographic entry see Field 2C.
W77-02106

MANAGING THE SOUTHWESTERN NATIONAL FORESTS FOR WATER AND RELATED RESOURCES,
Forest Service (USDA), Washington, D. C.
For primary bibliographic entry see Field 4A.
W77-02107

ARIZONA'S FROZEN ASSETS: VOLUMETRIC FORECASTS FROM SNOWPACK,
Arizona Water Commission, Phoenix.
For primary bibliographic entry see Field 2C.
W77-02108

WATERSHED MANAGEMENT'S EFFECTS ON MANY RESOURCES,
Arizona Univ., Tucson. School of Renewable Natural Resources.
For primary bibliographic entry see Field 3B.
W77-02109

WOODS CANYON--A LARGE SCALE WATERSHED MANAGEMENT EXPERIMENT: AN EXPLANATION AND INTERIM REPORT,
Forest Service (USDA), Flagstaff, Ariz. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 3B.
W77-02110

CHAPARRAL MANAGEMENT: ITS POTENTIAL--ITS PROBLEMS--ITS FUTURE,
Forest Service (USDA), Tempe, Ariz. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 3B.
W77-02111

OPERATION OF A RESERVOIR COLLECTING WATER FROM A SMALL WATERSHED,
Technion - Israel Inst. of Tech., Haifa. Lowdermilk Faculty of Agricultural Engineering.
For primary bibliographic entry see Field 4A.
W77-02126

CONTROLLING EROSION AND SEDIMENTATION AT CONSTRUCTION SITES,
G. Dallaire.
Civil Engineering, American Society of Civil Engineers, p 73-77, October 1976. 5 fig, 12 photo.

Descriptors: *Erosion control, *North Carolina, *Erosion, *Sedimentation, *Control, Control systems, Runoff, Sediments, Sediment transport, Water pollution control, Water supply, Projects.
Identifiers: *Control equipment, *Construction practices, *Construction sites, Sediment-laden runoff, Stream turbidity.

In recent years the Environmental Protection Agency (EPA) and a number of states have placed emphasis on controlling erosion and sediment-laden runoff from construction sites. Sediment from construction sites causes stream turbidity, impaired water quality, spoiled water supplies, unsightly deposits on adjacent property, and harm to aquatic life. North Carolina has one of the most progressive programs for controlling construction site erosion and sedimentation. This article described some of the methods used in North Carolina and by the EPA. Developers were urged to: (1) divert runoff water originating upstream from the construction site so that water would not flow over bare-earth areas and erode soil; (2) limit the area being graded on a site at any one time to prevent vast stretches of bare soil; (3) limit the time any given area was laid bare; and (4) trap sediment-laden runoff in temporary or permanent basins, or filter the runoff by using silt fences, wood-chip barriers, or brush barriers. (Roberts-ISWS)
W77-02146

FLOW RECESSION IN THE EPHEMERAL STREAM,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 2E.
W77-02162

INFLUENCE OF TALL WHEATGRASS WIND BARRIERS ON SOIL DRYING,
Agricultural Research Service, Sidney, Mont.
J. K. Aase, and F. H. Siddoway.
Agronomy Journal, Vol. 68, No. 4, p 627-631, July-August 1976. 10 fig, 24 ref.

Descriptors: *Windbreaks, *Wind erosion, *Soil erosion, *Soil water, *Montana, *Wheatgrasses, Evaporation, Soil stabilization, Crop response, Drying.

Studies were conducted to determine the effect of a tall wheatgrass (Agropyron elongatum) wind barrier system on soil drying from fallow soil compared with open-field fallow. A Williams loam soil near Sidney, Montana was used for the experiment. After a 3.8 cm irrigation was applied, soil water content was sampled at half-hour intervals and small depth increments to 10 cm. The top 4 cm of soil inside the barrier system stayed wetter for about 3 days after irrigation when compared with the unprotected area. Drying rates remained constant until about noon of the day after irrigation, at which time the rate was influenced by exposure to wind. Barriers could help during periods of small intermittent precipitation events in April and May by creating a suitable soil water environment for seed germination, plant emergence and establishment, and soil resistance to wind erosion. Barriers control wind erosion except when strong winds blow parallel or nearly parallel to them. If a wind shifts to parallel after intense thunderstorm activity, the wetter surface from barrier protection extends soil resistance to wind erosion. (Jahns-Arizona)
W77-02168

SALT MARSH ESTABLISHMENT AND DEVELOPMENT,
Environmental Concern, Inc., St. Michaels, Md.
E. W. Garbisch, P. B. Woller, and R. J. McCallum.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-014 136, Price codes: A06 in paper copy, A01 in microfiche. Coastal Engineering Research Center TM-52, June 1975. 110 p. 46 fig., 2 tab., 16 ref., 4 append. G31265. DACW72-73-C-0009.

Descriptors: *Vegetation establishment, *Shore protection, *Erosion control, *Coastal marshes, Salt marshes, Invertebrates, Benthos, Chesapeake Bay, Biological communities, Tidal effects, Intertidal areas, Plant growth
Identifiers: *Spartina alterniflora, Dredged material, Spartina patens, Spartina cynosuroides, Distichlis spicata, Ammopila breviligulata.

In order to evaluate coastal shoreline erosion control by vegetation, the establishment of 10 to 15 week-old seedlings of Spartina alterniflora throughout the tidal zone, and of S. patens, S. cynosuroides, Distichlis spicata and Ammophila breviligulata throughout the supra tidal zones of natural and manmade shores exposed to different seasonal wave regimes in the central Chesapeake Bay region was investigated. In areas subject to extensive wave and suspended coarse sediment stresses S. alterniflora transplant mortalities were high, increasing with decreased elevation within the intertidal zone, and with increasing exposure at a given intertidal level within a groin system. Periodic fertilization, and delaying the planting time by one month, reduced mortalities. Mortalities from other causes were negligible. Survival of all species established above these zones was independent of exposure, and development was comparable. Consolidated dredged material substrate stimulated higher S. alterniflora vegetative spread than at either the fertilized or unfertilized unconsolidated sandy substrates. Periodic profile leveling of shoreline areas indicated fluctuations in substrate surface; the surface of the dredged substrate decreased 3 to 7 centimeters. Monitoring of macrobenthic invertebrate colonization revealed that after one year the dredged material site had the highest total population and the natural sites, the lowest. (Luedtke-Wisconsin)
W77-02420

MINNESOTA WATER RESOURCES BOARD AND WATERSHED DISTRICTS.
Minnesota Water Resources Board, St. Paul.
For primary bibliographic entry see Field 6E.

W77-02428

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

A BIOASSAY TO ASSESS WASTEWATER TOXICITY TO AEROBIC BIOLOGICAL TREATMENT,
Oregon State Univ., Corvallis. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W77-02081

THE USE OF A SPECIFIC ION ELECTRODE FOR DETERMINATION OF BROMIDE IN SOILS,
Texas Engineering Experiment Station, College Station.
For primary bibliographic entry see Field 2G.
W77-02100

DIFFUSION CELL FOR ISOLATION OF HYDROGEN FLUORIDE FROM THE ANALYZED SAMPLE DETERMINING FLUORINE IN WATER, (IN RUSSIAN),
Main Geophysical Observatory, Leningrad (USSR).
N. Sh. Vol'Berg, and T. A. Kuz'Mina.
Gig Sanit 6, p 51-52, 1975.

Descriptors: *Fluorine, Pollutant identification, Isolation, *Fluorides, Sampling, Analytical techniques, Air pollution.
Identifiers: Analyzed, Cell, Design, Determining, Diffusion, Fluoride, Fluorine, Hydrogen, Isolation, New, Sample, Waste, Water, *Hydrogen fluoride.

A diffusion cell was designed for serial determinations of the content of F- in solid fluorides when analyzing air. To trap HF being liberated from the specimen, a cell cover made of a porous glass plate impregnated with KOH was used. The cell diffusion process consists of displacement of the volatile substance from its compound (for insoluble compounds), diffusion in a liquid layer, diffusion in a gas layer and diffusion in the pores of the sorbent. The cell design and the method of analysis provide high accuracy for measuring F- in solutions and can be used fr waste - and natural water determinations.
W77-02105

DETERMINATION OF SMALL QUANTITIES OF VINYL ACETATE IN AIR, WATER, ALCOHOLIC SOLUTIONS AND FOOD PRODUCTS, (IN RUSSIAN),
Science-Industry Association 'Plastoplimer', Leningrad (USSR).
L. I. Petrova, and Z. K. Boikova.
Gig Sanit 6, p 48-49, 1975.

Descriptors: *Pollutant identification, Foods, Air pollution, *Monitoring, Methodology, Plastics, *Analytical techniques, Sampling, *Colorimetry.
Identifiers: *Vinyl acetate.

In connection with the need to monitor the content of vinyl acetate in various media contacting plastics containing it, a method was developed permitting a sufficiently accurate determination of this substance not only in air but also in water, alcoholic solutions and food products. The method is based on the mericurization of vinyl acetate with the formation of complex compounds and subsequent colorimetric determination of the excess of mercuric acetate on the basis of the reaction with diphenylcarbazide. The sensitivity of the method is 0.001 mg in the analyzed sample.
W77-02117

EVALUATION OF THE RING OVEN TECHNIQUE FOR WATER MONITORING,
Atlantic Research Corp., Alexandria, Va.
R. E. Snyder, M. E. Tonkin, and A. M. McKissick.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-017 062, Price codes: A10 in paper copy, A01 in microfiche. Final Report September 1975. 209 p, 53 fig, 75 tab, 3 append. DADA17-73-C-3112.

Descriptors: *Pollutant identification, *Testing procedures, *Analytical techniques, *Monitoring, Evaluation, Water quality, Water pollution, Measurement, Testing, On-site tests, Water analysis, Chemical analysis, Iron, Lead, Magnesium, Zinc, Nitrates, Chlorides, Fluorides, Sulfates, Copper, Separation techniques.
Identifiers: *Ring oven technique, *Water test kit, Spot tests, Colorimetric tests, Field test kit, Thomas oven model E-10, Ring oven procedures, Iron content, Lead content, Nitrate content, Sulfate content.

The feasibility of using spot tests coupled with ring oven separation for the monitoring of selected species in natural water sources was demonstrated. The species investigated and their concentration ranges were: iron (0.1-10 ppm), lead (.05-1.0 ppm), magnesium (10-5000 ppm), zinc (1-20 ppm), chlorides (10-20,000 ppm), fluorides (0.1-10.0 ppm), nitrates (1.0-20 ppm), sulfates (10-3000 ppm), copper (0.1-5 ppm), calcium (20-10,000 ppm), cadmium (0.01-0.1 ppm), chromium (0.01-1 ppm), cyanide (0.1-5 ppm), manganese (0.02-2 ppm), and phosphate (0.02-2 ppm). (See also W77-02149) (Henley-ISWS)
W77-02148

EVALUATION OF THE RING OVEN TECHNIQUE FOR WATER MONITORING, APPENDICES,
Atlantic Research Corp., Alexandria, Va.
R. E. Snyder, M. E. Tonkin, and A. M. McKissick.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-017 063, Price codes: A06 in paper copy, A01 in microfiche. Final Report, 1975. 106 p. DADA17-73-C-3112.

Descriptors: *Pollutant identification, *Testing procedures, *Analytical techniques, *Laboratory tests, *Water quality, Water pollution, Measurement, Chemical reactions, Testing, Chemical analysis, Methodology, Water analysis, Separation techniques, Iron, Lead, Magnesium, Zinc, Nitrates, Chlorides, Fluorides, Sulfates, Copper, *Bibliographies.
Identifiers: Ring oven techniques.

Appendix A contained the results of the trial detection reagent evaluations for the 15 ions examined during this program. Reaction mechanisms and product structures were included if known. Appendix B described the separation schemes developed during this program for analysis of natural waters. Appendix C, Bibliography, contained 192 entries. (See also W77-02148) (Humphreys-ISWS)
W77-02149

AQUEOUS HALOGEN EQUILIBRIA, CASE I. HALOGEN IN PURE WATER,
Army Medical Bioengineering Research and Development Lab., Fort Detrick, Md.
For primary bibliographic entry see Field 5D.
W77-02150

PROGRAM REPORT-FY 1975, ATMOSPHERIC AND GEOPHYSICAL SCIENCES DIVISION, PHYSICS DEPARTMENT.
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 2B.
W77-02157

FECAL COLIFORM ANALYSIS: EFFECTS OF ELEVATED TEMPERATURES ON QUANTITATIVE RECOVERY,
Missouri Univ., Rolla. Dept. of Life Science.
J. B. Hufham.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 361, Price codes: A02 in paper copy, A01 in microfiche. Missouri Water Resources Research Center, Rolla, Completion Report, October 12, 1976. 11 p, 4 fig, 5 ref. OWRT A-089-MO(1), 14-34-0001-6026.

Descriptors: *E. coli, Water quality, Temperature, Water pollution, *Coliforms, *Cultures, *Isolation, *Pollutant identification, Analytical techniques.

The theoretical concept of cell and culture death resulting from increased temperature is important to an understanding of the inaccuracy of the fecal coliform test procedure. Results of study on the differential effects of temperature on various types of membrane filters show that the type of filter is an important variable. Recoveries of known densities of pure cultures of E. coli varied from 10-70 percent from this variable alone. The importance of selection of the proper temperature for membrane evaluation cannot be stressed too strongly. Results show that the interaction of the membrane with the cell, resulting in loss of cell viability, is temperature dependent and varies from brand to brand. A modified fecal coliform procedure has been developed and field tested. This new procedure lessens the detrimental effects of the temperature on recovery of the organism.
W77-02182

WATER-BORNE VIRUSES: THEIR CHARACTERIZATION BY RAMAN SPECTROSCOPY,
Connecticut Univ., Storrs. Inst. of Water Resources.
C. N. Burke, W. H. Nelson, and T. Girshick.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 354, Price codes: A02 in paper copy, A01 in microfiche. Completion Report, 1976. 6 p, 2 fig, 1 ref. OWRT A-055-CONN(1), 14-31-0001-4007.

Descriptors: *Viruses, *Centrifugation, *Public health, Water quality, *Spectroscopy, *Pollutant identification.
Identifiers: *Water-borne viruses, *Raman spectroscopy, *Density gradient centrifugation, Concentration methods, *Laser techniques, Temperature effects.

The research was designed to test raman spectrographic methods for sensitivity and specificity in identifying selected water-borne viruses, concentrating on those known to be pathogenic for man. Virus stocks of both DNA and RNA nucleic acid types, including Polio I, Sinbis, Vaccina and Vesicular stomatitis, were prepared and concentrated by density gradient centrifugation, using both sucrose and cesium chloride. Titrations of the viruses at several points were done using both plaque forming units and cytopathic effects in determining endpoints. Due to problems with instrumentation and especially virus concentration methods, raman spectrographic scans for prototype viruses did not result in clear-cut reproducible spectra. The differential centrifugation methods used did not provide a concomitant increase in titratable numbers of virus with reduction in total suspension volume. Although titration end-point determinations suggested levels as high as 10 to the 10th power to 10 to the 12th power had been achieved, spectra did not conform to theoretical numbers of viruses. The effects of using various laser sources and of temperature associated degradation, which may account for the theoretically high numbers of virus needed for satisfactory laser readings, may have also contributed to the unsatisfactory results. Other concentration methods are being considered. (de Lara-Connecticut)
W77-02183

U. OF I. URBANA-CHAMPAIGN

LASER METHODS OF RAPID DETECTION, IDENTIFICATION AND QUANTITATION OF HUMAN ENTERIC VIRUSES IN SEWAGE AND RIVERS,
Rhode Island Univ., Kingston. Dept. of Chemistry.
W. H. Nelson, and P. W. Chang.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 358, Price codes: A03 in paper copy, A01 in microfiche. Completion Report, September 1, 1976. 32 p, 16 fig, 4 tab, 10 ref. OWRT A-058-RI(1). 14-34-0001-6041.

Descriptors: Spectroscopy, *Viruses, *Pollutant identification, Enteric bacteria, Sewage, Instrumentation, Analytical techniques.
Identifiers: *Laser methods, *Raman spectroscopy, *Poliovirus, *Enteric viruses.

This study has shown that it is possible to obtain Raman spectra of poliovirus in water solution. Since a Raman spectrum can be obtained in minutes or even seconds, in principle, it has been demonstrated that very rapid analysis of viruses is possible. Details of virus preparation, purification, and concentration have been discussed. Polio I spectra are similar to those of plant viruses studied previously, but are sufficiently different to allow spectra to be used for identification purposes. Problems of instrument sensitivity and rapid sample preparation have to be overcome before a virus analysis machine based upon Raman spectroscopy can be used routinely.
W77-02184

OPTICAL REMOTE SENSING OF WATER POLLUTANTS,
Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
J. J. Gallagher, and J. B. McManus.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 346, Price codes: A03 in paper copy, A01 in microfiche. Georgia Environmental Resources Center, Atlanta, Report ERC 0876, August 1976, 23 p., 3 fig, 3 tab, 11 ref. OWRT A-046-GA(1). 14-31-0001-4010.

Descriptors: Pollutants, *Fluorescence, *Remote sensing, Instrumentation, *Pollutant identification, *Analytical techniques, Monitoring, Pulp wastes, Measurement.
Identifiers: *Raman effect, Optical scattering, Argon laser, Pulp mill effluence.

Calculations have been performed to compare three optical scattering processes for remote sensing of water pollutants. The relative merits of the Raman effect, the resonance Raman effect and fluorescence are discussed. The greater intensity of the fluorescence signal must be considered in comparing these techniques for remote sensing. Other factors such as quenching, absorption and multiple scattering must, in turn, be studied. Instrumentation of laser sources applicable to water pollutants monitored has been investigated to identify sources currently available for light scattering experiments. Preliminary measurements of Raman scattering using a single monochromator, an argon ion laser as the excitation source and photon counting techniques have been performed.
W77-02192

REVISED DEPARTMENT OF THE ARMY PESTICIDE MONITORING PROGRAM, 1 APRIL, 1975,
Army Environmental Hygiene Agency, Aberdeen Proving Ground, Md.
C. C. Roan.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-004 030, Price codes: A03 in paper copy, A01 in microfiche. Entomological Special Study No. 44-004-74175, 1975. 30 p, 1 tab, 5 append.

Descriptors: *Pesticides, *Monitoring, *Sampling, Sediments, Soils, Birds, Fish, Environment, Public Health, *Analytical techniques, *Pesticide residues, Insecticides, Carbamate pesticides, Halogenated pesticides, Organophosphorous pesticides, Metals, Polychlorinated biphenyls, *Pollutant indentification.

The necessity of, and mechanisms for stratification of environmental sampling are presented. This serves as the major basis for revision of the Department of the Army Pesticide Monitoring Program. The revised program further insures reliable monitoring data to support pesticide and pest management program changes. (Katz)
W77-02203

COMPILATION OF STATE DATA FOR EIGHT SELECTED TOXIC SUBSTANCES, VOL. 1, FINAL REPORT,
Mitre Corp., McLean, Va.
For primary bibliographic entry see Field 5G.
W77-02204

COMPILATION OF STATE DATA FOR EIGHT SELECTED TOXIC SUBSTANCES, VOL. IV, COMPILATIONS OF SUMMARIES AND ANALYSES OF STATE DATA,
Mitre Corporation, McLean, Va.
For primary bibliographic entry see Field 5G.
W77-02205

AN ECOSYSTEM ANALYSIS OF ENVIRONMENTAL CONTAMINATION BY LEAD,
Illinois Univ. at Urbana-Champagn. Inst. for Environmental Studies.
G. L. Rolfe, and A. Haney.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-248 593, Price codes: A07 in paper copy, A01 in microfiche. Report to National Science Foundation, August 1975. 133 p. 30 tab., 25 fig., 13 ref.

Descriptors: *Lead, *Metals, *Distribution patterns, *Path of pollutants, Water pollution, *Illinois, Toxicity, Ecological distribution, *Air pollution, Air-water interfaces, Sediments, Freshwater fish, *Food chains, Aquatic animals, Aquatic plants, Freshwater fish, Environmental gradients, Insects, Air-earth interfaces, Watersheds(Basins).
Identifiers: *Tetraethyl lead, Ecosystem analysis, Environmental contamination, *Saline branch watershed(Ill).

An 86-square-mile watershed in east-central Illinois, predominantly agricultural with a small urban area, was studied to determine the movement of lead into and through the area. The accumulation of lead in the terrestrial and aquatic biota were also examined. Combustion of gasoline was found to be the major source of lead input, accounting for 29,000 kg per year. Of this amount, about 13,000 kg remain airborne while 16,000 kg are deposited at ground level. Lead leaves the watershed at a rate of 910 kg per year through drainage water. The balance, 14,800 kg or 92.5 percent of the annual input, remains within the watershed. Lead concentrations in air, soils, stream sediments and the terrestrial and aquatic biota were determined. At present lead concentrations there is no apparent adverse effect on plants and animals. No biological magnification was discovered except in insect food chains. The major lead reservoirs are the soils (9 x 105 kg), plants (4 x 103 kg), and stream sediments (3 x 103 kg). The highest lead concentrations and a major portion of the stored lead are associated with the urban region and with areas adjacent to high-use rural roads. (Katz)
W77-02211

OCCURRENCE OF KEROSENE-LIKE HYDROCARBONS IN THE BREAM, MYLIO AUSTRALIS GUNTHER,
Queensland Dept. of Primary Industries, Hamilton (Australia). Sandy Trout Food Preservation Research Lab.
For primary bibliographic entry see Field 5C.
W77-02212

EFFECT OF ENVIRONMENTAL CONDITIONS ON THE DEGRADATION OF DDT IN MODEL MARINE ECOSYSTEMS,
Cornell Univ., Ithaca. N. Y. Lab. of Soil Microbiology.
For primary bibliographic entry see Field 5C.
W77-02213

A NEW TECHNIQUE FOR REMOTE MONITORING OF ACTIVITY OF FRESHWATER INVERTEBRATES WITH SPECIAL REFERENCE OXYGEN CONSUMPTION BY NIAIDS OF ANAX SP. AND SOMATOCHLORA SP. (ODONATA),
Environmental Protection Agency, Grosse Ile, Mich.
For primary bibliographic entry see Field 5C.
W77-02216

POLYELECTROLYTE PERSISTENCE IN A MUNICIPAL WATER SUPPLY,
Minnesota Univ., Minneapolis. Div. of Environmental Health
For primary bibliographic entry see Field 5F.
W77-02221

TUBIFICIDS (OLIGOCHAETA: TUBIFICIDAE) - INDICATORS OF THE QUALITY OF WATER BODIES, (IN RUSSIAN),
Akademiya Nauk Latvilskoi SSR, Riga. Inst. of Biology.
E. A. Parele, and E. B. Astapenok.
Latv Psr Zinat Akad Vestis 9, p 44-46, 1975.

Descriptors: Benthos, *Oligochaetes, *Tubificids, *Bioindicators, Europe, *Worms, Water quality, Water pollution, *Pollutant identification.
Identifiers: Latvian-SSR, USSR, Tubificid-aquatic plant associations.

Slightly setaceous worms have the leading role in the freshwater benthos of the Latvian SSR (USSR). Statistical material obtained on oligochaetes in large streams in 1962-1971 showed that tubificid-plant associations can be used as indicator organisms. By mathematical treatment of the data, standard coefficients D2, D3 and D4 weren obtained indicating the degree of the stream saprobiont. To determine coefficient D2, data on the total number of oligochaetes and turbificids is sufficient. To determine coefficients D3 and D4 all species of tubificids must be known.--Copyright 1976, Biological Abstracts, Inc.
W77-02225

THE MERCURY CONTENT OF MOLLUSKS IN THE PONTEVEDRA ESTUARY AS A MEASURE OF ITS DEGREE OF MERCURY CONTAMINATION, (IN SPANISH),
Institut Espanol de Oceanografia, Madrid (Spain). Central Labs.
J. Aravia Torre, and C. Masso.
Bol Inst Esp Oceanogr 191, p 1-10, 1975.

Descriptors: *Mercury, *Mollusks, *Pollutant identification, Estuaries, Water pollution sources, Europe, Clams, Industrial wastes, Pulp wastes, Mussels.
Identifiers: Cockles, Caustic soda, Pontevedra estuary(Spain), Arosa estuary(Spain)

A paper pulp factory and a caustic soda and Cl producing plant on the Pontevedro estuary, NW Spain, contaminated the bay with Hg. The Hg con-

tent of bay mollusks (clams, cockles, mussels) was compared with that of mollusks in a nearby unpolluted bay of the Arosa estuary. Contamination was found in a limited zone near the factories. In mussels 20 ppm Hg was found; 10 ppm was found in clams, and 12 ppm in cockles. The Hg content of mollusks declined rapidly with distance from the contamination source. In the uncontaminated Arosa estuary the average Hg content of fresh mussels was 0.014 ppm. At distant points in the contaminated bay, Hg content in mollusks dropped to 0.03 ppm or lower. The official danger level is 0.50 ppm; mollusk consumption is not restricted.--Copyright 1976, Biological Abstracts, Inc.
W77-02226

SOME ASPECTS OF MUNICIPAL OVERFLOW RESERVOIR MONITORING, (IN SWEDISH),
Uppsala Kommun (Sweden). Halsovard Forvaltning.
C. Forsberg, and S. O. Ryding.
Vatten 31(4), 347-358, 1975.

Descriptors: *Chlorophyll, *Monitoring, *Municipal water, Reservoirs, Vegetation, Nitrogen, Water supply, Phosphorus, *Overflow, Organic matter, *Pollutant identification.
Identifiers: *Sweden.

The effects of vegetation and other variable factors were studied by analyzing chlorophyll a is surface waters of lakes used as overflow reservoirs for the city of Uppsala, Sweden, including lakes Kyrkviken, Ramsjoen and Uttran during the period from May-Oct. for several years. A remarkable variability was recorded; seasonal average values do not reflect water quality. N,P and organic material were measured weekly and monthly and related to water flow for the river Fyris during the whole year of 1973 showing the variation of transport and the effect of sample averaging. Analytical procedures are recommended for testing water quality for overflow water reservoirs. A typical situation is plotted showing the 8 sites where water samples should be analyzed, including sites of inflow of natural waters, sites of outflow, and points where inflow occurs from purification works, where N is important and varies with the input quantity. Test should be made inside the reservoir at points remote from inflow and outflow, and should include 3-5 samples of surface water during vegetation periods and samples from 0-2 m in depth. Another location for analysis represents the influx of P and N from forest and cultivated land. For continual control of water quality, salt, pH, suspended material, organic material, chlorophyll a, N, phosphate P and total P must be determined. Industrial activity, climate and temperature may modify sampling frequency and the degree to which samples can be mixed. Water quality records should reflect actual conditions. Often procedures can be simplified by analyzing mixed samples, but base data are necessary and vary in different communities.--Copyright 1976, Biological Abstracts, Inc.
W77-02228

EMISSION SPECTROMETIC ELEMENT DETERMINATION IN THE NANO- AND PICOGRAM REGION AFTER VAPORIZATION OF THE ELEMENTS WITH GAS PLASMAS INDUCED WITH MICROWAVES: I. EXTREMELY SENSITIVE MERCURY DETERMINATION IN AQUEOUS SOLUTIONS, AIR ORGANIC AND INORGANIC MATERICES, (IN GERMAN),
Max-Planck-Institut fuer Metallforschung, Stuttgart (West Germany).
G. Kaiser, D. Goetz, P. Schoch, and G. Toelg.
Talanta 22(10/11), p 889-899, 1975.

Descriptors: *Mercury, *Pollutant identification, *Spectrophotometry, Analytical techniques, Trace elements, Measurement, Aqueous solutions.

The Hg in substances to be tested is quantitatively enriched by cementation or electrolytic precipitation on Cu and amalgamation with Ag or Au. It is then vaporized into Ar plasma by heating the carrier metals, and the light emitted is measured with a spectral photometer. All steps of the process are optimized with 203 Hg so that 0.05 ppm Hg may be detected in drinking water, surface water and sewage and may be measured simply and accurately in air and in organic and inorganic matrices. The absolute limit of detectability is 0.1 ng and the coefficient of variability is = or < 10%; the procedure takes about 15 min.--Copyright 1976, Biological Abstracts, Inc.
W77-02229

HYDROCHEMICAL CHARACTERISTICS OF THE OREL RIVER, (IN RUSSIAN),
Dnepropetrovskii Gosudarstvennyi Universitet (USSR). Inst. of Hydrobiology.
N. I. Varenko.
Gidrobiol Zh 11(5), p 79-81, 1975.

Descriptors: *Dissolved oxygen, *Phytoplankton, Rivers, Weather, Water chemistry, Water supply, Data collections, *Pollutant identification.
Identifiers: *Hydrochemical features, *Orel River(USSR), Ukrainian-Ssr, USSR.

Data are given on the chemical composition of the water of the Orel River, a left-bank tributary of the Dnieper River in the Ukrainian SSR (USSR). The chemical composition of the water is very diverse and is determined by a complex of physiographic and meteorological conditions and the water supply of the river. The comparatively high value of dissolved O2 is conditioned by phytoplankton development.--Copyright 1976, Biological Abstracts, Inc.
W77-02234

BIOLOGICAL MONITORING: SUBSTANTIATION AND EXPERIENCE IN ORGANIZATION, (IN RUSSIAN),
Moscow State Univ. (USSR).
V. D. Fedrov.
Gidrobiol Zh 11(5), p 5-11, 1975.

Descriptors: *Monitoring, *Bioindicators, *Bacteria, Biomass, Potable water, Phytoplankton, Productivity, Respiration, Water supply, Europe, *Pollutant identification, Reservoirs.
Identifiers: Substantiation, *Ucha Reservoir(USSR).

Observation and experiment should be the main methods of collecting information in a biological monitoring system. Biological indices are conveniently divided into 2 categories: functional, i.e., the rate of change of some function (indices of productivity, respiration, assimilation, etc.), and structural, i.e., some result of an action at the time of recording (biomass, number of species, content of matter in the system, etc.). These principles were used in setting up a program and organizing biological (phytoplankton, bacterioplankton) monitoring on the Ucha reservoir supplying Moscow (Russian SFSR, USSR) with drinking water.--Copyright 1976, Biological Abstracts, Inc.
W77-02235

TRACE ELEMENTS IN SOILS OF THE DNIEPER-BUG LIMAN, (IN UKRANIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
For primary bibliographic entry see Field 2G.
W77-02258

EFFECT OF RIVER POLLUTION ON AQUATIC BEETLES, (IN RUSSIAN),
Rostov-na-Donu Research Inst. of Neurocybernetics (USSR).
V. A. Minoranskii, and N. B. Dzhumailo.
Izv Sev-Kavk Nauchn Tsentra Vyssh Shk Estestv Nauki 3(3), p 92-93, 1975.

Descriptors: Water pollution effects, Indicators, Rivers, *Aquatic insects, *Bioindicators, Water quality, *Pollutant identification.
Identifiers: *Aquatic beetles, Don River(USSR), *Temernik River(USSR), Rheophils, Potamophils, Limnophils.

Aquatic beetles (17 spp.) were collected in the relatively clean Don River and 17 spp. in the polluted Temernik River flowing into the Don. Only 6 spp. were common to both rivers. The dominant species of beetles in these rivers were also different. In the Don 64.7% of all species were rheophils and potamophils; in the Temernik 82.3% were limnophils. Aquatic beetles can serve as indicators of the purity of rivers.--Copyright 1976, Biological Abstracts, Inc.
W77-02261

EXTRACTION-PHOTOMETRIC DETERMINATION OF MERCURY IN SOIL AND WATER, (IN RUSSIAN),
Uzhgorod State Univ. (USSR).
P. P. Kish, G. M. Vitenko, V. A. Sabov, and V. I. Buletsa.
Gig Sanit 11, p 74-76, 1975.

Descriptors: *Mercury, *Pollutant identification, *Photometry, *Soil analysis, *Water analysis, Separation techniques, Analytical techniques, Ions.

A proposed method of extraction-photometric determination of microquantities of Hg in soil and water is based on the extraction by benzene of the ion association formed by the anionic I complex of Hg with the action reagent methyl violet. The method is highly sensitive and permits simultaneous concentration and determination of Hg from greatly diluted solutions containing Hg to 0.002 microgram/ml. The determination of Hg is not disturbed by the presence of Zn,Cd,Mn,Co,Cu,Fe,Al,Pb,Cr or some other elements. The method is distinguished by good reproducibility and accuracy.--Copyright 1976, Biological Abstracts, Inc.
W77-02272

CASE OF SUBSURFACE WATER POLLUTION BY PETROLEUM PRODUCT WASTES, (IN RUSSIAN),
Meditsinskii Institut, Tselinograd (USSR).
For primary bibliographic entry see Field 5B.
W77-02273

COMPARISON OF METHODS FOR THE DETERMINATION OF TOTAL PHOSPHORUS IN WATERS CONTAINING PARTICULATE MATERIAL,
Massey Univ., Palmerston North (New Zealand). Dept. of Soil Science.
P. W. O'Connor, and J. K. Syers.
Journal of Environmental Quality, Vol. 4, No. 3, 1975. p 347-350, 4 tab, 18 ref.

Descriptors: *Phosphorus, Water quality, Water quality control, Water sampling, Sediments, *Pollutant identification, Methodology, Analytical techniques.

Perchloric acid digestion compared favorably with Na2CO3 fusion for the determination of total P in a range of waters containing varying concentrations of both P and particulate material. The recovery of particulate P by persulfate digestion tended to decrease with increasing particulate material concentration in both natural unfiltered samples and in filtered samples to which particulate material was added. Recovery of added soil particulate P by persulfate digestion also decreased with increasing particle size. Low recovery of P by persulfate digestion was caused by the incomplete extraction of P occluded within oxides and hydrous oxides of iron. Between 58 and 86% of the P not recovered by persulfate digestion

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was in the inorganic form. Persulfate digestion is not recommended for the determination of total P in waters containing particulate inorganic materials of soil origin. Perchloric acid digestion is considered to be a more suitable method for such samples. (Skogerboe-Colo St)
W77-02293

DESCRIPTIONS AND CHEMICAL ANALYSES FOR SELECTED WELLS IN THE CENTRAL SACRAMENTO VALLEY, CALIFORNIA,
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 2K.
W77-02299

WATER-QUALITY STUDY OF A REACH OF THE MERCED RIVER IN YOSEMITE NATIONAL PARK AND VICINITY, CALIFORNIA--APRIL 1973 THROUGH SEPTEMBER 1974,
Geological Survey, Menlo Park, Calif. Water Resources Div.
R. J. Hoffman, A. E. Dong, and G. L. Keeter.
Open-file report 76-326, August 1976. 66 p, 7 fig, 17 tab, 19 ref.

Descriptors: *Water quality, *Baseline studies, Sewage treatment, *Water analysis, *Chemical analysis, Biological properties, Chemical properties, Physical properties, Data collections, *California, Treatment facilities.
Identifiers: *Yosemite National Park(Calif), Preconstruction, Sewage plants.

A 25-mile reach of the Merced River was studied to provide the U.S. National Park Service with water-quality data prior to the operation of a new sewage treatment plant. Water-quality variables investigated were discharge, temperature, major chemical constituents, selected trace metals, specific conductance, suspended sediment, turbidity, dissolved oxygen, pH, total alkalinity, carbon dioxide, total organic carbon, nitrogen, phosphorus, algal growth potential, coliform bacteria, periphyton, and benthic invertebrates. Results indicate that water in the reach of the Merced River studied is a dilute system of good quality. Mean concentrations of nitrogen and phosphorus were highest in the Merced River at Rancheria Flat. Algal growth potential tests revealed that phosphorus was limiting algal growth at Happy Isles Bridge, El Capitan Bridge, and South Fork Merced River, which nitrogen was limiting it at Rancheria Flat. Input of excessive nitrogen and phosphorus concentrations in the Merced River during the summer low-flow period, and mixing with warm tributary inflow could cause excessive algal growth and production. (Woodard-USGS)
W77-02309

THE MERIDIAN-UPPER WILCOX AQUIFER IN MISSISSIPPI,
Geological Survey, Jackson, Miss. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-02310

MAPS SHOWING GROUND-WATER CONDITIONS IN THE LOWER BIG CHINO VALLEY AND WILLIAMSON VALLEY AREAS, YAVAPAI AND COCONINO COUNTIES, ARIZONA,
Geological Survey, Tucson, Ariz. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-02312

HYDROLOGY OF LAKE COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-02316

GROUND-WATER RESOURCES AND GEOLOGY OF ST. CROIX COUNTY, WISCONSIN,
Geological Survey, Madison, Wis. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-02321

GROUND-WATER HYDROLOGY OF THE COCOA WELL-FIELD AREA, ORANGE COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-02323

FLUID SAMPLER AND OXYGEN METER FOR SEWAGE PROCESSING - BIOLOGICAL OXYGEN DEMAND DETAILED CONTINUOUSLY BY REACTION VESSEL READ-OUT.
French Patent FR 2289-451. Issued August 4, 1975.
Derwent French Patents Abstracts, Vol. X, No. 36, p D3-D4, May 28, 1976.

Descriptors: *Patents, *Biochemical oxygen demand, *Sewage treatment, *Monitoring, *Activated sludge, Biological treatment, Aeration, Equipment, Analytical techniques, Instrumentation, *Pollutant identification.

A patent for a biochemical oxygen demand metering device which can be used in activated sludge type sewage treatment installations is described. The device has a reaction vessel which constantly receives a sample from the aeration tank and through which air is caused to flow. A vent is provided to allow air leaving the liquid sewage to escape into the atmosphere. Air from the vent can be conducted to an oxygen metering instrument in a second section of the device. A third section of the reactor is provided for feeding in the liquid sample, and a fourth section takes overflow back to the aeration tank. The device provides continuous biochemical oxygen demand readings in a minimum amount of time and is protected from soiling, clogging, and corrosion. (Kreager-FIRL)
W77-02340

CORRELATION OF BOD, COD AND SOLUBLE ORGANIC CARBON,
ADI Ltd., Fredericton (New Brunswick).
T. Viraraghavan.
Journal Water Pollution Control Federation, Vol. 48, No. 9, p 2213-2214, September, 1976. 2 tab, 4 ref.

Descriptors: *Carbon, *Organic compounds, *Biochemical oxygen demand, *Chemical oxygen demand, *Waste water(Pollution), Sewage, Groundwater, Septic tanks, Effluents, Analytical techniques, Solubility, Statistics, *Pollutant identification.
Identifiers: *Organic carbon(Soluble).

The degree of correlation between soluble organic carbon and oxygen demand (biochemical and chemical) was investigated for samples of raw sewage, septic tank effluent, and polluted groundwater. Biochemical and chemical oxygen demand were estimated by using the procedures in Standard Methods, and soluble organic carbon was measured by analyzing the filtrates of samples filtered through 24.25-centimeter glass fiber filters for organic carbon. The correlation coefficients between soluble organic carbon and biochemical or chemical oxygen demand for raw sewage and septic tank effluent were not significant at the 5% level; polluted groundwater also failed to show a significant correlation at the 5% level for soluble organic carbon and biochemical oxygen demand, although the correlation between the former and chemical oxygen demand was significant at the 1% level. Thus, the use of soluble organic carbon as a measure of organic matter in waste water should be made with caution. (Kreager-FIRL)
W77-02376

DETERMINATION OF CHEMICAL OXYGEN DEMAND (DIE BESTIMMUNG DER CHEMISCHEN OXIDIERBARKEIT),
F. J. Sprenger.
Vom Wasser, Vol. 46, p 125-138, 1976. 1 tab, 10 ref.

Descriptors: *Chemical oxygen demand, *Analytical techniques, Waste water(Pollution), *Organic compounds, *Oxidation, Chemical reactions, Kinetics, Temperature, Acidity, Alkalinity, Chlorides, *Pollutant identification.
Identifiers: Oxidizing agents, Potassium permanganate, Potassium dichromate.

The determination of chemical oxygen demand in water with dissolved organic compounds is discussed. Chemical oxygen demand determinations are made by oxidizing the organic matter in the water as completely as possible so that carbon dioxide and water are the final products. Preferred oxidizing agents include potassium permanganate in alkaline or acid solutions and potassium dichromate in acid solution. Generally, higher rates of oxidation are achieved with the latter compound. Although higher rates of oxidation may be obtained by increasing temperature and sulfuric acid concentration of the sample, secondary effects involving the simultaneous oxidation of chlorides rule out such means as being practical. (Kreager-FIRL)
W77-02380

INSTANTANEOUS METERING AIDS - ACTIVATED SLUDGE PLANT,
Suffolk County Dept. of Environmental Control, Hauppauge, N. Y. Operations Div.
B. A. Matzner.
Water and Wastes Engineering, Vol. 13, No. 8, p 18-20, August, 1976.

Descriptors: *Pollutant identification, *Analytical techniques, *Monitoring, *Suspended solids, *Aeration, *Biological treatment, Activated sludge, Nitrification, Denitrification, Sewage treatment, Waste water treatment, Liquid wastes, Feasibility, Performance, Evaluation Measurement, Treatment facilities, On-site investigations, Automation.

The feasibility of using an automatic instrument for the instantaneous measurement of mixed liquor suspended solids in the aeration tank of an activated sludge municipal treatment plant with extended aeration nitrification and suspended growth denitrification was demonstrated. The analyzer consists of two parts connected with cables: a sensing probe (mounted on the downflow side in the center of the aeration tank) and a remotely located indicator assembly which gives a direct digital readout in ppm. In the event of a decrease in solids in the mixed liquor, the analyzer alerts the operator to introduce additional solids into the aeration tank. When the solids reach the top of the optimum ppm range, as indicated by the automatic analyzer, the operator turns off the return sludge system and begins wasting sludge from the clarifiers. Continuous testing of the analyzer at the sewage treatment plant indicates that the instrument is reliable and provides an accurate measure of mixed liquor suspended solids. (Kreager-FIRL)
W77-02381

A STUDY OF BACTERIAL AEROSOLS AT A WASTEWATER IRRIGATION SITE,
Army Medical Bioengineering Research and Development Lab., Frederick, Md.
C. A. Sorber, H. T. Bausum, S. A. Schaub., and M. J. Small.
Journal Water Pollution Control Federation, Vol. 48, No. 10, p 2367-2379, October, 1976. 7 fig, 7 tab, 13 ref.

Descriptors: *Irrigation, *Air pollution, *Aerosols, *Bacteria, *Waste water treatment,

*Water reuse, Recreation facilities, On-site investigations, Sprays, Chlorination, Microorganisms, Efficiencies, Coliforms, Public health, *Pollutant identification.
Identifiers: Klebsiella.

A 4-week field study at a golf course irrigated with chlorinated secondary effluent was conducted to obtain data for a model designed to predict pathogen levels downwind from the spray source. Bacterial aerosols significantly above background were demonstrated at 198 m downwind from the nozzle, the greatest distance tested. At 152 m from the source, total aerobic counts of about 100/cu m and coliform-like counts of about 30/cu m were recorded. Among the isolates confirmed as coliforms biochemically, 58% were assigned to the genus Klebsiella; this is of public health significance since these bacteria are capable of producing respiratory and other infections in man. In two runs where chlorination was practiced, the mean reduction in total aerobic count observed at the irrigation spray nozzle was 99.6%, illustrating the effectiveness of this treatment for controlling the microbial aerosol problem. (Kreager-FIRL)
W77-02392

GAS AND LEACHATE FROM LANDFILLS: FORMATION, COLLECTION, AND TREATMENT. PROCEEDINGS OF A RESEARCH SYMPOSIUM.
Municipal Environmental Research Lab., Cincinnati, Ohio.
For primary bibliographic entry see Field 5E.
W77-02394

ANALYTICAL METHODOLOGIES FOR LEACHATE AND GAS ANALYSIS,
Illinois Univ. at Urbana-Champaign. Dept. of Civil Engineering.
E. S. K. Chian, and F. B. DeWalle.
In: Symposium on Gas and Leachate from Landfills: Formation, Collection, and Treatment, March 25-26, 1975, New Brunswick, New Jersey, Department of Environmental Science, Rutgers University, p 44-53. 4 fig. 15 ref.

Descriptors: *Pollutant identification, *Leachate, *Landfills, *Analytical techniques, *Sampling, *Chemical analysis, Conductivity, Color, Turbidity, Suspended solids, Nitrogen, Chemical oxygen demand, Physical properties, Chemical properties, Colorimetry, Heavy metals, Organic compounds.

Techniques for sampling and analyzing leachate samples from landfills are discussed. Strict anaerobic sampling and storage conditions are necessary to prevent extensive changes from occurring in the leachate sample prior to analysis. Samples should be stored in glass bottles for organic analysis and in plastic bottles for heavy metal analysis. The sequence of parameter analysis should be: oxidation-reduction potential, color, turbidity, suspended solids, pH, and conductivity. Other parameters such as chemical oxygen demand and organic nitrogen may also change directly after sampling, but these changes can be reduced by acidifying the sample. Chemical analysis using colorimetric methods is strongly interfered with by color, suspended solids, and high salt concentrations in the leachate. These interfering effects can be reduced by using a standard addition method or by diluting the leachate sample with increasing amounts of water to determine whether the interfering effect can be sufficiently reduced. (See also W77-02394) (Kreager-FIRL)
W77-02402

VARIATIONS IN GAS AND LEACHATE PRODUCTION FROM BALED AND NON-BALED MUNICIPAL REFUSE,
Systems Technology Corp., Dayton, Ohio.
For primary bibliographic entry see Field 5E.
W77-02404

GAS AND LEACHATE GENERATION IN VARIOUS SOLID WASTE ENVIRONMENTS,
Systems Technology Corp., Dayton, Ohio.
For primary bibliographic entry see Field 5E.
W77-02405

MONITORING TOXIC CHEMICALS IN LAND DISPOSAL SITES,
Illinois State Water Survey, Urbana.
W. H. Walker.
In: Symposium on Gas and Leachate from Landfills: Formation, Collection, and Treatment, March 25-26, 1975, New Brunswick, New Jersey, Department of Environmental Science, Rutgers University, p 123-129. 3 fig, 1 ref.

Descriptors: *Monitoring, *Landfills, *Groundwater, *Sampling, *Cores, Chemical analysis, Soil tests, Water pollution, Waste disposal, Solid wastes, *Pollutant identification.

Toxic chemical monitoring at landfill sites is discussed. Recent studies indicate that well monitoring systems may not be the most effective means to trace chemical pollutant flow paths or to determine groundwater chemical concentrations at any time or depth. Instead, chemical analyses of core samples from the underlying earth material profile may be preferred since these allow for a positive definition of any chemical constituent within the profile at any given location. This is true regardless of whether the chemicals are present in precipitated form in the zone of aeration, are held by retention on soil particles in the semisaturated fringe, or are dissolved in groundwater within the zone of saturation. Core sample monitoring is also faster and more economical than well monitoring. The number of sampling points required is primarily controlled by the expected variability of each parameter and the degree of monitoring accuracy desired. Initial soil core test probes which are made to obtain background data should be placed at the center of each sampling station. (See also W77-02394) (Kreager-FIRL)
W77-02409

NONPOINT-SOURCE POLLUTION IN SURFACE WATERS: ASSOCIATED PROBLEMS AND INVESTIGATIVE TECHNIQUES.
National Environmental Research Center, Las Vegas, Nev. Monitoring Applications Lab.
For primary bibliographic entry see Field 5B.
W77-02444

NATIONAL ENVIRONMENTAL STATISTICAL REPORT,
Mitre Corp., McLean, Va.
For primary bibliographic entry see Field 7C.
W77-02447

AN EVALUATION OF WATER QUALITY INFORMATION: A CASE STUDY OF STREAMS IN METROPOLITAN NEW JERSEY,
Rutgers - The State Univ., New Brunswick, N. J. Dept. of Geography.
R. M. Hordon.
Trans Ill State Acad Sci. 66(3/4), p 105-114, 1973.

Descriptors: *New Jersey, *Water quality, Urbanization, Data collections, Streams, River basins, Bacteria, Alkalinity, Color, Temperature, Hydrogen ion concentration, Dissolved oxygen, Computer programs, Biochemical oxygen demand, Pollutant identification, Turbidity.
Identifiers: Raritan River basin(NJ).

Some of the best water quality data sets available in New Jersey are routinely collected by large public potable water supply agencies. One set consisted of 11 variables (temperature, dissolved oxygen, turbidity, color, discharge, percent saturation, hardness, alkalinity biological oxygen demand (BOD), pH and bacteria) collected every week at 3 sites in the Raritan River Basin. Factor analysis using the Varimax rotation resulted in 3 factors: an oxygen-related factor (high inverse loadings on dissolved oxygen and temperature), an appearance factor (turbidity, color and discharge), and a 3rd variable factor occasionally loading on percent saturation. The cumulative percentage explained by the rotated factors declined during the decade, suggesting an increase in independence developing among the variables. It is hypothesized that urbanization with its commensurate changes in land use and runoff patterns might be intervening in the natural ecology of the stream. The effects of urbanization would interfere with instream interaction among the variables. Factor structures were quantitatively compared from year to year and from site to site by a computer program called RELATE.--Copyright 1975, Biological Abstracts, Inc.
W77-02448

A SIMPLE APPARATUS FOR METERING VOLATILE LIQUIDS INTO WATER,
National Marine Fisheries Service, Tiburon, Calif. Tiburon Fisheries Lab.
For primary bibliographic entry see Field 7B.
W77-02454

DIRECT OF X-RAY SPECTROMETRIC DETERMINATION OF BROMINE IN WATER,
Geological Survey of Israel, Jerusalem. Geochemical Dept.
Y. Deutsch.
Anal Chem. 46(3), p 437-440, 1974.

Descriptors: *Pollutant identification, *Bromine, *X-ray spectroscopy, Water analysis, Spectroscopy.

A rapid X-ray spectrometric method for the routine determination of bromine in water is based on the normalization of the background intensity of the sample to the background intensity of a pure water sample. Results agree fairly well with results of the standard oxidation reduction method. X-ray results for synthetic samples are very good, with a maximum error of 2%.--Copyright 1974, Biological Abstracts, Inc.
W77-02457

ARE THE CHESAPEAKE BAY WATERS WARMING UP,
Johns Hopkins Univ., Baltimore, Md. Dept. of Geography and Environmental Engineering.
For primary bibliographic entry see Field 2L.
W77-02472

MONITORING WATER QUALITY FROM LANDSAT.
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
J. L. Barker.
Available from the National Technical Information Service, Springfield, VA 22161 as N76-11543, Price Codes: A03 in paper copy, A01 in microfiche. Preprint X-923-75-190, July 1975. 33 p, 18 fig, 7 tab.

Descriptors: *Remote sensing, *Virginia, *Water quality, *Reservoirs, Satellites(Artificial), Data processing, Reflectance, Turbidity, Suspended solids, Land use, Mapping, Runoff, *Monitoring, Measurement, Pollutants, Water pollution sources, *Pollutant identification.
Identifiers: *LANDSAT, Areal measurements.

Water quality monitoring possibilities from LANDSAT were demonstrated both for direct readings of reflectances from the water and indirect monitoring of changes in use of land surrounding Swift Creek Reservoir in a joint project with the Virginia State Water Control Board and NASA. Film products were shown to have insufficient resolution, and all work was done by digitally processing computer compatible tapes. It was

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shown that areas of individual water bodies could be measured from LANDSAT with an accuracy that decreased from + or - 1% at 500 hectares to + or - 8% at 5 hectares. LANDSAT reflectances from water in the visible (MSS-4 and MSS-5) and near-infrared (MSS-6) spectral bands were shown to be nearly perfectly correlated and spatially coherent for both Swift Creek Reservoir and Lake Chesdin Reservoir, which has a ten times greater flow rate due to input from the Appomatox River. Perhaps the greatest potential contribution of LANDSAT is through indirect interpretation by detecting changes in land cover in a watershed. Land cover maps of the 18,000 hectare Swift Creek Reservoir watershed were prepared for two dates in 1974. A significant decrease in the pine cover was observed in a 740 hectare construction site within the watershed. A measure of the accuracy of classification was obtained by comparing the LANDSAT results with visual classification at five sites on a U-2 photograph. Such changes in land cover can alert personnel to watch for potential changes in water quality. (Sims-ISWS)
W77-02494

REMOTE SENSING OF EFFECTS OF LAND-USE PRACTICES ON WATER QUALITY,
Kentucky Univ., Lexington. Dept. of Forestry
D. H. Graves.
Available from the National Technical Information Service, Springfield, VA 22161 as N76-15525, Price codes: A02 in paper copy, A01 in microfiche. Report NASA CR-144105, December 1975. 17 p, 3 ref, 2 append. NASA NAS8-31006.

Descriptors: *Remote sensing, *Land use, *Forests, *Water quality, Satellites(Artificial), Aircraft, Aerial photography, Data processing, Watersheds(Basins), Vegetation, Vegetation effects, Surveys, *Pollutant identification.
Identifiers: *LANDSAT.

Six watersheds having a total area of 539 hectares (1330 acres) comprised the study area. All six study watersheds were forested, but two had been partially surface mined. One watershed had been fertilized with ammonium nitrate, and another was tentatively scheduled for logging in the summer of 1976. The other two watersheds were utilized as controls. Vegetative ground truth survey was begun in February, 1975. The ground truth survey of forest types was completed by May 1, 1975. Receipt in May of 1:24,000 MSS and CIR imagery from the April 7, 1975 NASA aircraft over-flight of the study areas permitted vegetative typing of the reclaimed sites. Water quality and quantity information was collected for each study watershed. Each watershed was instrumented with a weir, water stage recorder, and precipitation gage. Weekly grab samples were taken at each weir and analyzed for several water quality parameters. Physical parameters measured included turbidity, temperature, and suspended sediment. It was mentioned that color infrared and multispectral imagery from the aircraft overflights and LANDSAT imagery were to be used for land classification and change detection. Also, aircraft and satellite multispectral imagery was to be color enhanced, and the resultant enhanced imagery was to be utilized to supplement the data yield of the primary imagery. Several types of land use change were indicated by LANDSAT imagery and color composites. Appendixes contain two papers recently presented. (Sims-ISWS)
W77-02497

MULTIDISCIPLINARY APPLICATION OF LANDSAT-2 DATA TO MARINE ENVIRONMENT IN CENTRAL JAPAN,
Toba Merchant Marine Coll. (Japan).
For primary bibliographic entry see Field 2L.
W77-02498

USE OF LANDSAT DATA FOR NATURAL RESOURCES INVESTIGATION IN THE LOWER BASIN OF DANUBE AND DANUBE DELTA,
Institutul de Constructii din Bucuresti (Rumania). Lab. for Remote Sensing.
For primary bibliographic entry see Field 2L.
W77-02503

SKYLAB STUDY OF WATER QUALITY,
Geological Survey, Lawrence, Kans.
H. L. Yarger, and J. R. McCauley.
Available from the National Technical Information Service, Springfield, VA 22161 as N76-17460, Price codes: A03 in paper copy, A01 in microfiche. Report NASA-CR-144505, Final Report, EREP No. 540G-1, 38 p, July 1975. 16 fig, 3 tab, 2 ref, 1 append. NAS-9-13271.

Descriptors: *Reservoirs, *Water quality, *Impounded waters, Water properties, *Suspended solids, *Kansas, Impoundments, Surface waters, Domestic water, Recreation, Eutrophication, Mineralogy, Nutrients, Water analysis, Water chemistry, Suspension, Satellites(Artificial), Water resources, Dissolved solids, *Pollutant identification.
Identifiers: *SKYLAB, *Mineral constituents, Inorganic sediment, Reflected energy, Artificial reservoirs, Algal nutrients.

Apparent reflectance lvels inl the SKYLAB S190A and S192 bands from one pass over three Kansas reservoirs, exhibit good statistical correlation with suspended solids. Band ratios appear to yield the best results. The concentration of suspended solids, mostly inorganic sediment, has the most effect on the reflected energy. Dissolved solids concentrations up to 200 ppm were not detectable by the SKYLAB sensors. (Henley-ISWS)
W77-02505

OZONE REMOVAL FROM ARC LAMP COOLING AIR,
Auburn Univ., Ala. Charles Richard Saunders Chemical Lab.
For primary bibliographic entry see Field 7B.
W77-02511

BIO-REFRACTORY INDEX FOR ORGANICS IN WATER,
Connecticut Univ., Storrs. Dept. of Civil Engineering.
F. L. Hart, and T. Helfgott.
Water Research, Vol 9, p 1055-1058. 1975. 3 tab, 12 ref. OWRT A-030-CONN(8), 14-31-0001-3007.

Descriptors: *Organic compounds, *Aquatic environment, Persistence, *Oxygen demand, *Nitrogen, Industrial waste, Laboratory tests, *Biodegradation, *Pollutant identification, Degradation(Decomposition)
Identifiers: *Refractory index, *Degree of degradation.

A method of classifying specific aquatic borne organic materials according to degradability is presented. Laboratory procedures and rationale are given for the development of a parameter referred to as the Refractory Index (R.I.). Examples of refractory index values and significance are offered. Representative data are presented for which there is roughly a 13% relative error for each R.I. value. Materials characterized as refractory (having a low R.I. value) are persistent for the conditions stipulated in the ultimate BOD test and therefore low R.I. indicates persistence in the water environment. Materials having low R.I. values should not be discharged in receiving waters unless extensive examinations show that the material can be effectively removed by treatment or does not cause harmful effects in the aquatic environment. (de Lara-Connecticut)
W77-02520

ENVIRONMENT AND POLLUTIONS. SOURCES, HEALTH EFFECTS, MONITORING AND CONTROL,
For primary bibliographic entry see Field 5G.
W77-02521

A SENSITIVE ALGAL ASSAY: AN IMPROVED METHOD FOR ANALYSIS OF FRESHWATERS,
Connecticut Univ., Storrs. Inst of Water Resources
R. L. Klotz, J. R. Cain, and F. R. Trainor
Journal of Phycology, Vol. 11, No. 4, p 411-414, 1975. 1 fig, 6 tab, 10 ref. OWRT A-052-CONN(13), 14-31-0001-3807.

Descriptors: *Bioassay, *Aquatic algae, Freshwater, *Carrying capacity, *Connecticut, Pollutant identification, Nutrients.
Identifiers: *Algal assay, Dilute medium, *Selenastrum, *Sensitive assay, *Nutrient-poor rivers, Willimantic/Shetucket River(Conn), Natchaug River.

An algal assay capable of detecting the carrying capacity of nutrient-poor rivers was developed. In order to eliminate carry-over of nutrients, thus masking the true nutrient condition of the water tested, a new growth medium was developed. This maintenance medium contained less than 4 mg/l total inorganic salts. With an inoculum of 10⁴ cells/ml the test organism Selenastrum capricornutum Printz was grown in sterile-filtered river water and transferred daily with a 1:1 dilution. The assay was carried out for 4 or 5 days, at which time cell number was calculated, and the doublings per day were determined. Comparisons are made with similar but less sensitive assays, on the basis of both daily and 5-day readings. (de Lara-Connecticut)
W77-02524

DISTRIBUTION OF AQUATIC YEASTS - EFFECT OF INCUBATION TEMPERATURE AND CHLORAMPHENICOL CONCENTRATION ON ISOLATION,
Connecticut Univ., Noank. Marine Research Lab.
J. D. Buck
Mycopathologia, Vol. 56, No. 2, p 73-79, 1975. 1 fig, 4 tab, 30 ref. OWRT A-052-CONN(14). OWRT 14-31-0001-3807

Descriptors: *Yeasts, *Aquatic microorganisms, Rivers, Estuaries, *Marine fungi, Temperature, *Incubation, *Connecticut, Coasts, Isolation, Sewage treatment, Filters, Membranes, Filtration, Waste water treatment.
Identifiers: *Chloramphenicol, *Candida, *Torulopsis, *Membrane filter techniques.

Fresh (river), estuarine and marine waters in and along the coastline of Connecticut were cultured by the membrane filter technique at 20 and 37C on a complex medium containing 0-1000 mg/l of chloramphenicol. Using counts on medium with 500 mg/l antibiotic as a base, ratios of total and pink yeast counts were recorded for other chloramphenicol concentrations at both temperatures for the waters sampled. Variable results were obtained. In general, both total and pink yeast counts decreased with increasing antibiotic levels, being most apparent at 400 mg/l chloramphenicol. Medium without antibiotic and with 100 mg/l always produced bacterial overgrowth. A total of 209 white yeasts were isolated from all platings; the genera Torulopsis, particularly T. candida, and Candida were dominant with lesser numbers of Cryptococcus, Trichosporon sporogenous genera, and Kloeckera. Most species isolated were found on media at all chloramphenicol levels. Comparisons were made of yeast distributions in these temperate waters with reports from other areas. (de Lara-Connecticut)
W77-02525

THE EUTROPHICATION IMPLICATIONS OF INTERACTIONS BETWEEN NATURALLY OCCURRING PARTICULATES AND METHANE OXIDIZING BACTERIA,
Ohio State Univ., Columbus. Dept. of Microbiology.
For primary bibliographic entry see Field 5C.
W77-02536

MODIFICATION OF A COMMERCIAL SPECTROFLUOROMETER FOR RAPID DETERMINATION OF NEAR INFRARED EMISSION,
Auburn Univ., Ala. Charles Richard Saunders Chemical Lab.
For primary bibliographic entry see Field 2K.
W77-02537

LIPIDS OF SMITTIUM CULISETAE,
Ohio State Univ., Columbus. Dept. of Microbiology.
M. A. Patrick, V. K. Sanger, and P. R. Dugan.
Mycologia, Vol. 65, No. 1, p. 122-127, Jan.-Feb., 1973. 2 tab, 14 ref. OWRT A-024-OHIO(2).

Descriptors: *Lipids, *Gas chromatography, *Pollutant identification, Chromatography, Analytical techniques, Organic compounds, Organic acids.
Identifiers: *Smittium culisetae, *Thin-layer chromatography, Triglycerides, Diglycerides, Fatty acids, Steroids.

Neutral and polar lipids of Smittium culisetae were separated by silicic acid column and thin-layer chromatography. 76.3% of the total lipids was found to be neutral lipids and 23.7% was polar. Triglycerides were the most abundant (26.6%) of the lipids with lesser amounts of free fatty acids, steriods and diglycerides. The major phosphatide was phosphatidyl choline (17.8%) while phosphatidyl ethanolamine and phosphatidyl serine were present in smaller amounts. Gas chromatography of methyl esters of the fatty acids obtained from the individual lipid classes showed that the most abundant unsaturated fatty acid was palmitoleic (38.7%) and the predominant saturated fatty acid was palmitic (34.3%). (Chao-Ohio St)
W77-02547

THE ROLE OF SOLAR ULTRAVIOLET RADIATION IN 'NATURAL' WATER PURIFICATION,
Kentucky Univ., Lexington. Dept. of Radiation Medicine.
For primary bibliographic entry see Field 5D.
W77-02552

ORGANIC COMPOUNDS IN PULP MILL LAGOON DISCHARGE,
Washington Univ., Seattle. Coll. of Forest Resources.
H. F. Hrutfiord, T. S. Friberg, D. F. Wilson, and J. L. Wilson.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-246 900, Price codes: A04 in paper copy, A01 in microfiche. Report EPA-660/2-75-028, June 1975. 69 p, 14 fig, 14 ref, 16 tab.

Descriptors: *Pulp wastes, *Organic compounds, Aerated lagoons, *Discharge(Water), Wastes, Industrial wastes, Water pollution sources, Phenols, Acids, Liquid wastes, Aromatic compounds, Organic wastes, Waste treatment, Waste water treatment, Water pollution treatment, Water pollution control, Pulp and paper industry, Washington, Pacific Northwest U. S., Effluents, *Pollutant identification.
Identifiers: Terpenes, Resin acids, Fatty acids, Sugar acids, Terpineol, Camphor, Kraft mills.

Organic compounds entering and leaving kraft mill aerated lagoons have been identified and determined quantitatively. The compounds found included terpenes, resin and fatty acids, phenols, and sugar acids. The terpenes,resin and fatty acids are similar to those present in the wood species being pulped. Some terpenes, phenols, and sugar acids are produced during the pulping reactions. About 8 ppm total terpenes were found in the lagoon influent and 1 ppm or less in the effluent. Alpha-terpineol was the major compound entering the lagoon, and camphor the main terpene in the effluent. The total resin acid concentration entering the lagoon was 3.2 ppm, with 0.6 ppm leaving. Fatty acids were lower, both entering and leaving the lagoon. Sugar acids were entering at about 100 ppm, but were usually eliminated in the lagoon. Terpenes can be controlled by in-process steam stripping, and the other compounds can be partially controlled by in-plant spill containment. (Witt-IPC)
W77-02558

THE USE OF TENAX FOR THE EXTRACTION OF PESTICIDES AND POLYCHLORINATED BIPHENYLS FROM WATER. II. TESTS WITH ARTIFICIALLY POLLUTED AND NATURAL WATERS,
Rome Univ. (Italy).
For primary bibliographic entry see Field 5G.
W77-02561

CHEMICAL CATALYST INTERFERENCE IN THE WINKLER TITRATION DETERMINATION OF DISSOLVED OXYGEN -- A METHOD FOR CORRECTION,
Mixing Equipment Co., Inc., Rochester, N.Y.
M. B. Lakin.
Water Research, Vol. 10, No. 11, p 961-966, 1976. 2 fig, 5 ref.

Descriptors: *Water analysis, *Dissolved oxygen, Catalysts, *Volumetric analysis, Cobalt, Chemical precipitation, Oxidation, Analytical techniques, Chemical analysis, Water chemistry, Water quality, *Pollutant identification.
Identifiers: *Winkler test, Sodium sulfite.

A new procedure involving the measurement of a chemical blank is introduced to correct the cobalt interference effect associated with the Winkler titration analysis for dissolved oxygen. Unsteady-state reaeration studies employed for mechanical aerator evaluation tests show that when sodium sulfite is used in the presence of a cobalt ion catalyst to deoxygenate the test basin water, a chemical interference is detected in the Winkler determination of dissolved oxygen content. The interference is attributed to a chemical precipitate that forms in the reaeration process. Evidence suggests that the Co(II) ion is oxidized to the (III) oxidation state forming a cobalt (III) hydroxide in the alkaline test environment. Upon acidification of the test samples during the Winkler procedure, the CO(III), a powerful oxidizing agent, is released and in turn effects an increase in the amount of free iodine released and measured by titration. The additional iodine liberated in this manner yields erroneous oxygen concentration values which are then used to calculate the oxygen mass transfer coefficient. Considerable deviation from the true value of the coefficient can result. (Witt-IPC)
W77-02564

5B. Sources Of Pollution

UTILITY OF URBAN RUNOFF MODELING, (PROCEEDINGS OF A SPECIAL SESSION, SPRING ANNUAL MEETING, AMERICAN GEOPHYSICAL UNION, WASHINGTON, D.C. 14 APRIL 1976.
American Society of Civil Engineers, New York.
For primary bibliographic entry see Field 2A.
W77-02076

EFFECTS OF SELECTED CHEMICALS ON MOVEMENT, GROWTH AND SURVIVAL OF CERTAIN AQUATIC ANIMAL LIFE,
Kansas Univ., Lawrence. Dept. of Physiology and Cell Biology.
For primary bibliographic entry see Field 5C.
W77-02084

SEPTIC TANK EFFLUENT MOVEMENT THROUGH SOIL,
Maine Univ. at Orono. Dept. of Soil Chemistry.
E. G. Lotse.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 368, Price codes: A05 in paper copy, A01 in microfiche. Maine Land and Water Resources Institute, Orono, Completion Report, June 1976. 71 p, 30 fig, 6 tab, 22 ref. OWRT A-029-ME(1).

Descriptors: Soils, Phosphorus, Nitrogen, Sorption, Effluents, *Septic tanks, *Nutrient removal, *Path of pollutants, Maine, Nitrates, Dispersion, Diffusion, Soil water movement, Ammonium, Water pollution sources, Waste water treatment.
Identifiers: Septic tank effluent, *Phosphorus removal, *Nitrogen removal, Adsorption fields(Septic tanks).

The rate and extent of phosphorus and nitrogen movement in selected Maine soils were studied under continuous and intermittent loading. Conditions approximating those of septic tank adsorption fields were simulated. For intermittently operated columns, there was no breakthrough of phosphorus when 8.0, 12.4 and 15.0 pore volumes of effluent, respectively, had been collected. For continuously operated columns, however, breakthrough occurred at 10.8 and 11.2 pore volumes, respectively. The greater the hydraulic loading, the greater was the rate of phosphorus movement through a given soil. Septic tank adsorption field systems should have several trenches and large total length of trench in order to minimize the movement of phosphorus and contamination of groundwaters. Nitrate breakthrough occurred before one pore volume of effluent had been collected from each column. The rate of diffusive and dispersive transport appeared to be low compared to the rate of convective transport. Ammonium breakthrough occurred when 2.5 to 6.5 pore volumes of effluent had been collected. The rate of ammonium movement was higher under continuous loading than under intermittent loading conditions. The septic tank adsorption field system is inefficient in removing nitrogen from sewage effluents.
W77-02087

A SUBMODEL FOR NITROGEN RELEASE FROM SEDIMENTS,
Copenhagen Univ. (Denmark). Freshwater Biological Lab.
O. S. Jacobsen, and S. E. Jorgensen.
Ecological Modelling, Vol. 1, No. 2, p 147-151, July 1975. 1 fig, 2 tab, 18 ref.

Descriptors: *Model studies, *Nitrogen, Nutrients, *Sediments, Anaerobic conditions, Aerobic conditions, Organic matter, Fertilization, Decomposing organic matter.
Identifiers: *Nitrogen release.

A submodel for the aerobic and anaerobic nitrogen release from sediment is set up. The rate of nitrogen release R is correlated to the nitrogen content by the following equations: R sub AN=84S sub N + 1.6 (anaerobic); R sub AE=58S sub N + 1.9 (aerobic); where: S sub N is mg N/ml in the sediment. The influence of temperature is included by use of an exponential expression, since the release is governed by a biochemical decomposition of organic matter. (Skogerboe-Colo St)
W77-02099

EFFECTS OF PHOSPHORUS ON SOME PHYSICAL AND CHEMICAL PROPERTIES OF CLAYS,
West Pakistan Agricultural Univ., Lyallpur.
For primary bibliographic entry see Field 2G.
W77-02101

SULFUR FRACTIONS AND CARBON-NITROGEN-PHOSPHORUS-SULFUR RELATIONSHIPS IN SOME BRAZILIAN AND IOWA SOILS,
Iowa State Univ., Ames.
For primary bibliographic entry see Field 2G.
W77-02102

A MIXED-DIMENSION KINEMATIC ESTUARINE MODEL,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
For primary bibliographic entry see Field 2L.
W77-02131

THE CIRCULATION AND SALINITY DISTRIBUTION OF THE UPPER POTOMAC ESTUARY,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
For primary bibliographic entry see Field 2L.
W77-02132

DISTRIBUTION OF SALINITY AND TEMPERATURE IN THE HUDSON ESTUARY,
City Univ., of New York. Inst. of Marine and Atmospheric Sciences.
For primary bibliographic entry see Field 2L.
W77-02141

OXYGEN IN A TIDAL RIVER: LOW TIDE CONCENTRATION CORRELATES LINEARLY WITH LOCATION,
North Carolina Univ. at Chapel Hill. Marine Sciences Program.
For primary bibliographic entry see Field 2L.
W77-02145

A COMPARISON OF LUMPED-PARAMETER AND DIFFUSIONAL MODELS DESCRIBING THE EFFECTS OF THE OUTLET BOUNDARY CONDITIONS ON THE MIXING IN FLOW SYSTEMS,
City Coll., New York. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 2L.
W77-02147

CHARACTERIZATION OF URBAN RUNOFF,
Rutgers - The State Univ., New Brunswick, N.J. Water Resources Research Inst.
W. Whipple, Jr, B. B. Berger, C. D. Gates, R. M. Ragan, and C. W. Randall.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 459, Price codes: A02 in paper copy, A01 in microfiche. Summary Report, September 1976, 21 p. OWRT C-5341 (No 4239) (5).

Descriptors: *Water quality, Water pollution, Heavy metals, Nutrients, Suspended solids, Sewers, *Urban hydrology, *Storm drains, Biochemical oxygen demand, *Urban runoff, Organic wastes, Sediments, Storm runoff.
Identifiers: Urban runoff pollution, Storm hydrograph loading, Storm event loadings, Unrecorded pollution.

A joint effort to characterize urban runoff was conducted by five universities. The project objective was to contribute to improved technology for analysis of undesirable effects of unrecorded pollution in heavily developed areas, including heavy metals, nutrients, suspended solids and BOD. Use was made of individual samples and of continuous sampling throughout storm hydrographs. Some streams and storm sewers studied had a single outlet, but larger rivers were sampled above and below the urban area, using mass balance analysis to determine the pollution entering the stream between the two points. The latter method presented considerable problems. The results confirmed previous findings that urban areas contribute substantial amounts of organic, nutrient and suspended sediment pollution, with commercial and industrial areas contributing more than residential areas. Similar findings were made for heavy metals, with concentrations of lead in urban runoff approximating those for phosphorus. A special study indicated no support for the widely used hypothesis that pollution loadings in urban runoff vary as the length of time since the previous storm. More data are contained in individual reports by the five contributing universities.
W77-02180

THERMAL PLUMES IN THE KANSAS RIVER,
Kansas Water Resources Research Inst., Manhattan.
Y. S. Yu, and S. K. Kaul.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 351, Price codes: A03 in paper copy, A01 in microfiche. Contribution No. 182, August 1976. 33 p, 8 fig, 13 tab, 5 ref, append. OWRT A-066-KAN(1). 14-31-0001-5016.

Descriptors: *Thermal properties, *Kansas, *Thermal pollution, Velocity, Themperature, Thermodine, Distribution patterns, Path of pollutants, Electric power plants.
Identifiers: *Kansas River(Kan), Shallow streams, *Thermal plumes.

A case study of the heated discharge from the Tecumseh Power Plant into the Kansas River was conducted to determine the velocity and temperature distributions in the near field of the thermal plume in a reach about 350 ft long. The stream flow was 460 cfs with an average depth about 2 to 3 ft. The heated discharge from a submerged outlet 4 ft in diameter was 40 cfs and the measured initial temperature rise after passage of condensors was 40 deg F. The results show that the presence of a relatively stagnant region immediately upstream from the heated effluent affected significantly the shape and temperature distribution in the near-field of the plume. The outer boundary of the plume extended more than 10 pipe diameters upstream from the outlet and the maximum width of spreading across the stream was 12 diameters. The temperature rise in a vertical water column was not uniform but decreased with increasing depth from the surface. No ambient water was present beneath the plume. The decay of maximum temperature rise with the longitudinal distance was slow in the region less than 10 diameters and became rapid beyong that.
W77-02187

TRANSIENT MOVEMENT OF WATER AND SOLUTES IN UNSATURATED SOIL SYSTEMS, PHASE II,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 2G.
W77-02189

WATER POLLUTION INVESTIGATION: DULUTH-SUPERIOR AREA,
Midwest Research Inst., Kansas City, Mo.
A. D. McElroy, and S. Y. Chin.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-239 409, Price codes: A06 in paper copy, A01 in microfiche. Environmental Protection Agency, Chicago, Illinois, Report EPA 905/9-74-014, October 1974. 99 p, 37 tab, 17 fig, 15 ref.

Descriptors: *Water pollution, *Water quality *Model studies, *Simulation analysis, Minnesota Wisconsin, Methodology, Waste disposal, Wast treatment, Waste water treatment, Industri wastes, Domestic wastes, Water quality, Oxyger *Oxygen demands, *Oxygen sag, Great Lakes Lake Superior, Sewage treatment, River basins.
Identifiers: *Duluth-Superior Area(Minn-Wisc *Lower St. Louis River basin(Minn-Wisc), Bes practicable technology, Effluent limits, Benthi oxygen demands.

The Lower St. Louis River Basin from Brooksto to Lake Superior was sampled in late 1973. Th resultant data were combined with historical dat for verification of a water quality model--the S Louis River Basin Model, developed under separate contract (EPA No. 68-01-1853). Th model was used to evaluate the effect on wate quality of implementing effluent limits using be: practicable technology and best availab technology for industrial discharges, and second ry treatment for municipal waste sources, required by the 1972 Amendments to the Feder Water Pollution Act. The study indicates that in plementation of the above effluent limits, as we as utilization of a centralized treatment plant advanced design, will result in a significant in provement in water quality in the Lower St. Lou River. However, with current benthic oxygen d mand rates, DO in the reservoirs is projected border on noncompliance at summer low flov even with essentially zero discharge of pollutan from industrial and municipal sources in th Cloquer area. (Katz)
W77-02202

WATER QUALITY IMPACTS OF URANIU MINING AND MILLING ACTIVITIES IN TH GRANTS MINERAL BELT, NEW MEXICO,
Environmental Protection Agency, Dallas, Te Region VI.
For primary bibliographic entry see Field 5G.
W77-02208

FATE AND EFFECTS OF OIL POLLUTANTS I EXTREMELY COLD MARINE ENVIRO MENTS,
Louisville Univ., Ky.
For primary bibliographic entry see Field 5C.
W77-02210

AN ECOSYSTEM ANALYSIS OF ENVIRO MENTAL CONTAMINATION BY LEAD,
Illinois Univ. at Urbana-Champagn. Inst. for E vironmental Studies.
For primary bibliographic entry see Field 5A.
W77-02211

EXCHANGE OF NUTRIENTS AND TRAC METALS BETWEEN MARSH SEDIMENTS AN ESTUARINE WATERS - A FIELD STUDY,
Clemson Univ., S. C. Dept. of Chemistry a Geology.
L. R. Gardner.
Available from the National Technical Inform tion Service, Springfield, VA 22161 as PB-261 49 Price codes: A06 in paper copy, A01 in microfich South Carolina. Water Resources Research I stitute, Clemson, Report No. 63, September 197 95 p, 13 fig, 6 tab, 64 ref, 2 append. OWRT B-05 SC(5).

Descriptors: *Marshes, *Estuaries, *Silic *Phosphorous, Alkalinity, Metals, Water qualit Simulation analysis, *South Carolina, Trace el ments, Nutrients, Sediments, Estuarine enviro ment, *Path of pollutants, Copper, Zinc, Molyb lenum, Water pollution sources.
Identifiers: *Trace metals, *Marsh sediments.

Some of the effects of marshes on the quality adjacent coastal waters are described and some the mechanisms of materials exchange betwe

marshes and estuaries are identified. Data were collected on the quantity and quality of runoff from marshes during low tide exposure and on the chemistry of interstitial waters and marsh sediments. The results indicate that marshes export phosphorous and silica in amounts comparable to the supply of these elements by terrestrial stream flow and that marshes take up Cu, Zn and Mo but at rates so low that the effect on the concentrations of these elements in coastal waters is immeasurably small. The export of silica and phosphorous from marshes is due chiefly to the diffusion of these substances from the sediment into a thin layer of water on the marsh surface that slowly drains during low tide exposure. A mathematical simulation of the process was formulated which qualitatively fits the observed pattern of silica concentration in the runoff.
W77-02217

THERMAL EFFECTS ON BIODEGRADATION OF POLLUTANTS IN WATER,
Memphis State Univ., Tenn. Dept. of Biology.
C. G. Hollis.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 912, Price codes: A03 in paper copy, A01 in microfiche. Research Report No. 53, December 3, 1976. 29 p, 8 fig, 1 tab, 37 ref. OWRT A-037 TENN(1).

Descriptors: *Biodegradation, *Linear alkyl sulfonates, Water pollution, Water quality, *Thermal pollution, Water temperature, Organic compounds, Organic wastes.
Identifiers: *Linear alkyl benzenesulfonates, Trace organics.

The rate of biodegradation of linear alkyl benzenesulfonate was increased as temperature was increased from 5C to 35C in 10C increments. At 45C and 55C, the compound was not degraded. Biodegradation was enhanced by acclimatizing the sewage seed to LAS when compared to using unacclimatized seed and seed acclimatized to temperature only. Carbon chain degradation, sulfate removal and benzene ring opening of the LAS molecule were somewhat simultaneous and were influenced by incubation temperatures. The presence of glucose in the reaction mixture retarded the rate of LAS carbon chain biodegradation. The data suggest thermal pollution would increase the rate by which trace amounts of biodegradable organic compounds, such as LAS, would be degraded in water.
W77-02218

MOVEMENT OF FERTILIZER AND HERBICIDE THROUGH IRRIGATED SANDS,
Florida Univ., Gainesville. Dept. of Soil Science; and Florida Univ., Gainesville. Inst. of Food and Agriculture.
R. S. Mansell, F. M. Rhoads, L. C. Hammond, H. M. Selim, and W. B. Wheeler.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 505, Price codes: A04 in paper copy, A01 in microfiche. Florida Water Resources Research Center, Gainesville, Publication No. 38, September 10, 1976. 50 p, 21 fig, 4 tab, 20 ref, append. OWRT A-026-FLA(10). 14-34-0001-6010.

Descriptors: Infiltration, Irrigation, Herbicides, Fertilizers, Kinetics, Sorption, Soils, Path of pollutants, *Sands, *Florida, Irrigated land, Leaching.
Identifiers: Trickle irrigation.

The simultaneous movement of water and selected agrichemicals (fertilizer nutrients and herbicide) through sandy soils is of particular importance to the efficient use of fertilizers and irrigation water by agricultural crops. Efficient use of fertilizers and herbicides applied to Florida's sandy soils is desirable for maintaining optimum growth of plants and for minimizing groundwater contamination. Laboratory and field experiments as well as mathematical models were used to study water and solute (potassium and phosphorus nutrients and 2,4-D herbicide) transport in two representative Florida soils: Wauchula sand and Troup sand. In an irrigated and fertilized corn experiment, grain yields and efficiency of water use were observed to be mutually related to both the irrigation and the fertilizer application treatments. Leaching of applied nutrients and irrigation water from the soil 'rooting zone' resulted in decreased water use efficiency in these soils. Mathematical models were developed and used to simulate transport and chemical-physical reactions for potassium, phosphorus and 2,4-D herbicide in these soils. Reactions such as adsorption-desorption, chemical precipitation and immobilization (fixed) greatly influenced the movement and thus potential leaching of these solutes through the soil.
W77-02219

PROCEEDINGS: 8TH ANNUAL WATER RESOURCES SEMINAR GROUNDWATER RESOURCES AND DEVELOPMENT NOVEMBER 24 AND 25, 1975.
Minnesota Univ., Minneapolis. Water Resources Research Center.
For primary bibliographic entry see Field 4B.
W77-02223

TUBIFICIDS (OLIGOCHAETA: TUBIFICIDAE) - INDICATORS OF THE QUALITY OF WATER BODIES, (IN RUSSIAN),
Akademiya Nauk Latvilskoi SSR, Riga. Inst. of Biology.
For primary bibliographic entry see Field 5A.
W77-02225

SOME HYGIENIC PROBLEMS RELATED TO THE USE OF HERBICIDES OF THE 2,4-DICHLOROPHENOXYACETIC ACID GROUP, (IN RUSSIAN),
Tomsk Meditsinskii Institut (USSR).
For primary bibliographic entry see Field 5G.
W77-02231

NITROGEN IN THE SOIL WATER OF THE ECOSYSTEM OF THE AMAZONIAN PRAIRIES, (IN PORTUGESE),
Instituto Nacional de Pesquisas da Amazonia Manaus (Brazil).
A. Dos Santos, and M. D. G. Ribeiro.
Acta Amazonica 5(2), p 173-182, 1975.

Descriptors: *Nitrogen, *Soil water, Ecosystems, South America, Vegetation, Metabolism, Microorganisms, *Grasslands, Seasonal, Decomposing organic matter, *Biodegradation.
Identifiers: *Brazil, Prairies, *Amazonian prairies(Brazil).

The main sources of N in the soil water of the ecosystem of the Amazon campina (Brazil) are decomposing material, (litter), water running off the vegetation and the byproducts of the metabolism of microorganisms. Water samples from the watertable at 4 white sand sites (regosol) were analyzed for NH4, NO2 and NO3 and the concentration of organic N and total N were calculated. There was a greater concentration of organic N present than in that from other origins. NH4-N was the principal product of the formation of organic material by microorganisms and it had the 2nd largest concentration; NO3 and NO2 were almost always absent because of the soil acidity (pH 3.0). There are annual and seasonal variations in the N compounds. The greatest quantities were obtained in the middle of the dry season. On white sand N is not a limiting factor for the development of the natural vegetation.--Copyright 1976, Biological Abstracts, Inc.
W77-02239

ANALGOLOGICAL SURVEY OF THE SONDELEDFJORD NEAR RISOR, S. NORWAY: A 'LAND-LOCKED' FJORD EXPOSED TO POLLUTION, (IN NORWEGIAN),
Oslo Univ. (Norway). Inst. of Zoology.
J. P. Nilssen.
Blyttia 33(1), p 17-26, 1975.

Descriptors: *Fjords, *Algae, Cyanophyta, Estuaries, Sewage, *Littoral, Salinity, Temperture, Surveys, Outfall sewer, Pulp wastes, Oxygen, Chlorophyta, Path of pollutants, *Water pollution.
Identifiers: *Norway, Polysiphonia-hemisphaerica, Sills, *Analgological surveys.

The algal vegetation in the littoral zone in the Sondeledfjord near Risor, S Norway is described. A review is given of the physical and chemical condition in the fjord. The estuary is moderately brackish, having a salinity all year of approximately 20%. The temperature and salinity gradients are considerable; thus water renewal seldom occurs in the deep. The sills are numerous and between them are stagnant waters. The fjord is open at both ends; this, together with the number of sills, exposes it to further pollution. The pollutants, domestic sewage and pulp mills, mostly come from the neighboring areas. The structure of the different algal communities is dependent upon the distance from a sewer outfall. In the vicinity of an outfall the algal community was dominated by green and blue-green algae. This may be due to interspecific competition, light, O2 condition, amount of sewage, exposure, water movements, etc. Two characteristic algal profiles and the distribution of Polysiphonia hemisphaerica are given.--Copyright 1976, Biological Abstracts, Inc.
W77-02252

THE EFFECT OF BOTTOM SEDIMENTS ON FORMATION OF SURFACE WATER COMPOSITION, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
I. G. Garasevich, I. K. Palamarchuk, and B. I. Nabivanets.
Gidrobiol Zh 11(6), p 18-27, 1975.

Descriptors: *Bottom sediments, Sampling, Industrial wastes, Water pollution sources, Surface waters.
Identifiers: Biogens, *USSR, *Sugar refinery wastes.

The mechanical and chemical composition of bottom sediments was studied in 2 tributaries of the Ros. River, Kamenka and Roska (USSR). Sampling was done in sections subjected to sugar-refinery waste and in 'pure zones'. Bottom sediments influenced by sugar-refinery waste release a great number of biogens and organic substances and may be a source of surface water secondary pollution.--Copyright 1976, Biological Abstracts, Inc.
W77-02259

MEASURES FOR THE PROTECTION OF THE RIVERS ZETA AND MORACA, (IN SERBO-CROATIIAU),
Zavod za Zastitu Prirora, Titograd (Yugloslavia).
For primary bibliographic entry see Field 5G.
W77-02267

CASE OF SUBSURFACE WATER POLLUTION BY PETROLEUM PRODUCT WASTES, (IN RUSSIAN),
Meditsinskii Institut, Tselinograd (USSR).
N. I. Anan'Ev, A. A. Kyuregyan, and L. A. Rybina.
Gig Sanit 10, p 97-98, 1975.

Descriptors: *Oil pollution, *Oil wastes, *Water pollution sources, Water supply, Industrial wastes, Path of pollutants, Chemical analysis, *Pollutant identification, Subsurface waters.

Identifiers: Kazakh-Ssr, USSR, *Alekseevka(USSR).

The water supply of the city of Alekseevka (Kazakh SSR, USSR) is obtained from fissure waters of Ordovician granitoids by means of 10 wells. In Dec. 1973 petroleum products began to appear in the tap water. Petroleum wastes poured onto the soil surface and into primitive settling tanks by industrial plants were the source of pollution. These plants were located on high ground and the petroleum products penetrated along the fissures to the groundwater level. Metal tanks are presently being used for temporary waste storage. Chemical analysis revealed a decrease in the content of petroleum products in the water. Some time is required before they disappear entirely from the aquifer.--Copyright 1976, Biological Abstracts, Inc.
W77-02273

A MODEL FOR THE SIMULTANEOUS PRODUCTION AND DIFFUSION OF FERROUS IRON IN SUBMERGED SOILS,
Agricultural Univ., Wageningen (Netherlands). Dept. of Soils and Fertilizers.
For primary bibliographic entry see Field 2G.
W77-02278

FIXATION OF IRON AND ZINC APPLIED AS CHELATES INTO A SOIL COLUMN DURING LEACHING,
Hebrew Univ., Rehovoth (Israel). Dept. of Soil and Water Science.
For primary bibliographic entry see Field 2G.
W77-02280

EFFECT OF LIME ON BORON TRANSPORT TO AND UPTAKE BY COTTON,
Arkansas Univ., Fayetteville. Dept. of Agronomy.
For primary bibliographic entry see Field 3F.
W77-02282

INTERACTIONS OF MICRONUTRIENTS IN BARLEY GROWN ON ZINC-POLLUTED SOILS,
Himachal Pradesh Univ., Palampur (India).
For primary bibliographic entry see Field 2G.
W77-02287

NITROGEN LOSSES FROM SOILS OF THE NORTH CAROLINA COASTAL PLAIN,
North Carolina State Univ., Raleigh. Dept. of Soil Science.
R. P. Gambrell, J. W. Gilliam, and S. B. Weed.
Journal of Environmental Quality, Vol. 4, No. 3, p 317-323, 1975.

Descriptors: *Nitrogen, *Denitrification, *Nutrients, Soils, Soil investigations, Drainage, Drainage effects, Fertilizers, Fertilization, *North Carolina, Return flow, Sediments, Corn(Field), *Coastal Plains.

Nitrogen balances were measured for a moderately well-drained and a poorly drained soil in the North Carolina Coastal Plain to evaluate the effect of drainage on the fate of unutilized fertilizer N. Approximately one-half of the fertilizer N applied to each soil was not utilized by the crop. Most of the nitrogen lost by surface runoff from both soils was organic nitrogen associated with the sediment. However, there was a measurable increase in loss of nitrogen from fertilized plots as compared to unfertilized plots. The poorly drained soil (27% organic matter) had approximately 50% less surface runoff than did the moderately well-drained soil (2% organic matter). However, the concentration of N in runoff from the poorly drained soil was almost twice as great resulting in nearly identical N losses from the two soils. Much of the total surface loss of N from corn occurred during the first few months after planting. (Skogerboe-Colo St)
W77-02294

THE DISTRIBUTION OF TWO MOSQUITO-LARVIVOROUS FISHES, GAMBUSIA AFFINIS AND ORYZIAS LATIPES, IN THE TOKYO METROPOLITAN AREA, (IN JAPANESE),
Tokyo Univ. (Japan). Dept. of Parasitology.
For primary bibliographic entry see Field 5G.
W77-02297

STATUS OF GROUND-WATER MODELING IN THE U.S. GEOLOGICAL SURVEY,
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 2F.
W77-02300

PREDICTED AND OBSERVED TEMPERATURE AND WATER-QUALITY CHANGES OF LAKES AND RESERVOIRS,
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 2H.
W77-02304

RECONNAISSANCE OF GROUND-WATER RESOURCES OF THE SQUAXIN ISLAND INDIAN RESERVATION, WASHINGTON,
Geological Survey, Tacoma, Wash. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-02308

WATER-QUALITY STUDY OF A REACH OF THE MERCED RIVER IN YOSEMITE NATIONAL PARK AND VICINITY, CALIFORNIA--APRIL 1973 THROUGH SEPTEMBER 1974,
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 5A.
W77-02309

TRANSVERSE MIXING IN NATURAL CHANNELS,
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 2E.
W77-02313

EFFECTS OF WATER MANAGEMENT ON FRESH-WATER DISCHARGE TO BISCAYNE BAY,
Geological Survey, Tallahassee, Fla. Water Resources Div.
For primary bibliographic entry see Field 4A.
W77-02314

A BIVARIATE-REGRESSION MODEL FOR ESTIMATING CHEMICAL COMPOSITION OF STREAMFLOW OR GROUNDWATER,
Geological Survey, Lakewood, Colo. Water Resources Div.
T. D. Steele.
Hydrological Sciences Bulletin, Vol 21, No 1, p 149-161, March 1976. 3 fig, 6 tab, 23 ref.

Descriptors: *Water quality, *Computer models, *Network design, Streams, Groundwater, Regression analysis, Chemical analysis, Data collections, Computer programs, Statistical methods, Data storage and retrieval.
Identifiers: *SYSLAB programs.

Regression between concentrations of major inorganic constituents and either specific conductance or streamflow discharge characterize chemical-quality conditions at a sampling site or of an area and can be used to estimate streamflow chemical-quality composition over time and in space where information is lacking or deficient. In this manner, less costly water quality network operations may be achieved for a given programme, enabling available resources to be reallocated to the collection and analysis of data where information is deficient. The SYSLAB system is a sequential set of documented special-purpose computer programs for statistically and graphically analysing historical water-quality records and deriving relevant regression relationships based upon this analysis. These computer programs have been applied under a variety of hydrological conditions to characterize regional chemical-quality patterns across the United States and in Pakistan. Case-study results using the proposed methodology are presented for Nigeria, Japan, and Pakistan. (Woodard-USGS)
W77-02317

MODELING COLIFORM-BACTERIA CONCENTRATIONS AND PH IN THE SALT-WEDGE REACH OF THE DUWAMISH RIVER ESTUARY, KING COUNTY, WASHINGTON,
Geological Survey, Tacoma, Wash. Water Resources Div.
W. L. Haushild, and E. A. Prych.
Open-file report 76-415, 1976. 43 p, 11 fig, 4 tab, 22 ref.

Descriptors: *Water quality, *Model studies, *Coliforms, *Hydrogen ion concentration, *Estuaries, *Washington, Mathematical models, Data collections, Evaluation, Equations, Salinity, Water temperature, *Bacteria, Decomposing organic matter, *Path of pollutants.
Identifiers: *Duwamish River estuary(Wash), King County(Wash).

Total- and fecal-coliform bacteria, plus pH, alkalinity, and dissolved inorganic carbon are water-quality parameters that have been added to an existing numerical model of water quality in the salt-wedge reach of the Duwamish River estuary in Washington. The coliform bacteria are modeled using a first-order decay (death) rate, which is a function of the local salinity, temperature, and daily solar radiation. The pH is computed by solving a set of chemical-equilibrium equations for carbonate-bicarbonate buffered aqueous solutions. Concentrations of total- and fecal-coliform bacteria computed by the model for the Duwamish River estuary during June-September 1971 generally agreed with observed concentrations within about 40 and 60 percent, respectively. The computed pH generally agreed with observed pH within about a 0.2 pH unit; however, for one 3-week period the computed pH was about a 0.4 unit lower than the observed pH. (Woodard-USGS)
W77-02324

MOVEMENT OF HEAVY METALS BELOW SEWAGE DISPOSAL PONDS,
California Univ., Riverside. Dept. of Soil Science and Agricultural Engineering.
L. J. Lund, A. L. Page, and C. O. Nelson.
Journal of Environmental Quality, Vol. 5, No. 3, p 330-334, July-September, 1976. 7 fig, 4 tab, 10 ref.

Descriptors: *Heavy metals, *Sewage disposal, *Sludge disposal, *Soil analysis, *Treatment facilities, Zinc, Cadmium, Copper, Chromium, Nickel, Chemical oxygen demand, Metals, Ponds, Soil chemical properties, Soil contamination effects, Soil investigations, On-site investigations, Solubility, Sewage treatment, *Path of pollutants.
Identifiers: Metal-organic complexes.

The extent of downward movement of zinc, cadmium, copper, chromium, and nickel in coarse-textured soils beneath sewage sludge and effluent disposal ponds at two sewage treatment plants was investigated. Concentrations of acid-extractable metals were greater under disposal ponds than at offplant control sites at both treatment plants. Metal enrichment was evident at depths as great as 3 m under some ponds; and zinc, cadmium, copper, chromium, and nickel levels at this depth ranged as high as 75, 10, 30, 30, and 70 micrograms/gram, respectively. The depth and degree of metal enrichment depended on the specific pond type and the treatment plant. Metal concentrations

were greater under anaerobically digested sludge-holding ponds than under effluent ponds. Concentrations of the metals in saturation extracts of soils beneath the ponds were much greater than those typically found for California soils. The distributions of the metals with depth were closely related to changes in chemical oxygen demand of soil samples with depth, suggesting that the metals were transported as soluble metal-organic complexes. (Kreager-FIRL)
W77-02379

TRACE ELEMENTS IN THE ENVIRONMENT OF SOME GOITER REGIONS OF THE TASHKENT OBLAST, (IN RUSSIAN),
Uzbekskii Nauchno-Issledovatelskii Institut Sanitarii, Gigieny i Profzabolevanii, Tashkent (USSR).
For primary bibliographic entry see Field 5G.
W77-02388

INTERACTIONS OF FERRIC AND FERROUS IRONS AND ORGANIC MATTER IN WATER ENVIRONMENT,
Tokyo Metropolitan Univ. (Japan). Dept. of Chemistry.
T. Akiyama.
Geochem J. 7(3), p 167-177, 1973.

Descriptors: *Iron, *Organic matter, *Chemical precipitation, Iron compounds, Environment, Iron oxides, Algae, Bacteria, Biodegradation, *Chlorophyta, Dissolved solids, Lipids.

Coprecipitation of organic matter with ferric and ferrous hydroxide, and Fe holding in a solution containing organic matter were experimentally studied. The dissolved organic matter from bacterial degradation of green algae was used. Ferrous Fe, as well as ferric Fe, coprecipitate organic matter under reduced conditions and ferric and ferrous irons selectively coprecipitate proteinous materials. On the contrary, pigment and lipid materials are rarely coprecipitated and hold ferric Fe in dissolved form probably by forming water soluble Fe-organic complexes. The significance of the interaction of organic matter and Fe in their cycle in the hydrosphere is shown.--Copyright 1974, Biological Abstracts, Inc.
W77-02389

THEORETICAL APPROACH TO GAS MOVEMENT THROUGH SOILS,
Ohio State Univ., Columbus. Dept. of Civil Engineering.
C. A. Moore.
In: Symposium on Gas and Leachate from Landfills: Formation, Collection, and Treatment, March 25-26, 1975, New Brunswick, New Jersey, Department of Environmental Science, Rutgers University, p 33-43. 22 fig, 2 ref.

Descriptors: *Landfills, *Gases, *Methane, *Mathematical models, *Waste disposal, Solid wastes, Physical properties, Chemical properties, Soil physical propperties, *Path of pollutants.

A mathematical model for predicting the flow of gases around sanitary landfills is presented along with some preliminary results. The mathematical analogue decouples the physical characteristics of the gases, the porous medium, and the areal geology. Interactions between the gas and the liquid or solid phases can be incorporated into the analogue through equilibrium equations. A solution to the analogue, assuming a 70% methane level in the landfill for 5 years and no excess total pressure, yields the following information: the maximum radial extent of the 5% methane level above the elevation of the landfill base extends for 1.28-2.25 times the radius of the landfill, depending on the perviousness of the ground surface; decay to below 5% methane requires from 1 to over 150 years; decomposition times in excess of 5 years result in further excursion of the 5% methane level; as the porosity of the soil increases, the 5% methane excursion distance increases; a small degree of perviousness of the ground surface is very effective in reducing the 5% methane excursion; vents are effective in reducing methane concentrations along a radial line passing through the vent but are essentially useless in reducing methane along radial lines a few degrees away from the line through the vent; and circumferential trenching can significantly reduce methane concentrations. (See also W77-02394) (Kreager-FIRL)
W77-02401

LEACHATE ATTENUATION IN UNDISTURBED AND REMOULDED SOILS,
Waterloo Univ. (Ontario). Dept. of Civil Engineering.
G. J. Farquhar, and F. A. Rovers.
In: Symposium on Gas and Leachate from Landfills: Formation, Collection, and Treatment, March 25-26, 1975, New Brunswick, New Jersey, Department of Environmental Science, Rutgers University, p 54-70. 14 fig, 8 tab, 15 ref.

Descriptors: *Attenuation, *Leachate, *Soils, *Landfills, Analytical techniques, Solid wastes, Soil types, Soil tests, Soil water, *Path of pollutants, Waste dilution.

Soil attenuation of landfill leachate was studied by comparing the flow and contaminant removal patterns in columns containing both undisturbed and remoulded samples of the same soil. A significant degree of attenuation by dilution was provided by the water retained in the soil below the field capacity. Remoulded soils provided more attenuation by dilution than did undisturbed soils. When flow conditions were intergranular, the use of remoulded soil columns for estimating attenuation was acceptable; thus, the estimation of attenuation using dispersed soil reactors corrected for the degree of dilution appears to be acceptable. Removal isotherms constructed from dispersed soil studies can be used to predict the breakthrough curves for some contaminants. This can be accomplished for contaminants where the isotherms constructed from dispersed soil studies are linear. (See also W77-02394) (Kreager-FIRL)
W77-02403

LEACHATE MIGRATION THROUGH SELECTED CLAYS,
Illinois State Geological Society, Urbana.
R. A. Griffin, and N. F. Shimp.
In: Symposium on Gas and Leachate from Landfills: Formation, Collection, and Treatment, March 25-26, 1975, New Brunswick, New Jersey, Department of Environmental Science, Rutgers University, p 92-95.

Descriptors: *Migration, *Leachate, *Attenuation, *Landfills, *Clay minerals, *Chemical analysis, Mercury, Lead, Zinc, Cadmium, Calcium, Iron, Manganese, Chemical oxygen demand, Waste disposal, Solid wastes, Ion exchange, Ions, Metals, Montmorillonite, Kaolinite, Illite, Path of pollutants.

Leachate migration through three different clay minerals was investigated as part of an effort to evaluate the potential use of clay as a liner for landfills. Montmorillonite clay exhibited the strongest attenuatioN, being about four times more effective than illite and five times more effective than kaolinite. Mercury, lead, zinc, and cadmium were the components most strongly attenuated by the clays. Calcium, iron, and manganese showed on attenuation. Chemical oxygen demand showed a relatively low attenuation. Adsorption studies revealed that the most important factors affecting the prediction of a given metal ion's migration under a solid waste disposal site are the pH of the solution, the cation exchange capacity of the clay, and the ionic composition of the solution matrix. A computer simulation model was written to predict metal ion migration through clay columns. (See also W77-02394) (Kreager-FIRL)
W77-02406

ORGANIC POLLUTANTS CONTRIBUTED TO GROUNDWATER BY A LANDFILL,
Robert S. Kerr Environmental Research Lab., Ada, Okla.
W. J. Dunlap, D. C. Shew, J. M. Robertson, and C. R. Toussaint.
In: Symposium on Gas and Leachate from Landfills: Formation, Collection, and Treatment, March 25-26, 1975, New Brunswick, New Jersey, Department of Environmental Science, Rutgers University, p 96-110. 7 fig, 4 tab, 21 ref.

Descriptors: *Groundwater, *Landfills, *Leachate, *Waste disposal, *Water pollution, Chemical analysis, Organic compounds, Domestic wastes, Solid wastes, Leaching, On-site investigations, *Path of pollutants.

Groundwater from a well within a landfill and from a control well was sampled using a modified low-flow carbon adsorption procedure to determine the contribution of organic compounds to groundwater resulting from the disposal of refuse. Column chromatography, solubility separation, and gas chromatography/mass spectrometry measurements revealed low levels of many undesirable organic chemicals in the groundwater which were apparently leached from the landfill. More than 40 compounds were identified, most of which were chemicals commonly employed in industry for the manufacture of domestic and commercial products. The source of these compounds was apparently manufactured products which were discarded in the landfill since it had not received appreciable wastes from industrial operations. The results demonstrated the potential for long-term pollution of groundwater as a result of solid waste disposal in landfills. (See also W77-02394) (Kreager-FIRL)
W77-02407

ATTENUATION MECHANISMS OF POLLUTANTS THROUGH SOILS,
Arizona Univ., Tucson. Coll. of Agriculture.
W. H. Fuller, and N. Korte.
In: Symposium on Gas and Leachate from Landfills: Formation, Collection, and Treatment, March 25-26, 1975, New Brunswick, New Jersey, Department of Environmental Science, Rutgers University, p 111-122. 4 fig, 7 tab, 6 ref.

Descriptors: *Attenuation, *Soil types, *Leachate, *Landfills, *Clay minerals, Chromium, Mercury, Nickel, Lead, Copper, Arsenic compounds, Beryllium, Cadmium, Zinc, Chemical analysis, Path of pollutants.
Identifiers: Vanadium, Selenium, Oxisols, Ultisols.

Soil columns were leached with a landfill leachate spiked with selected potentially hazardous elements to investigate soil attenuation mechanisms. The relative mobility of 11 trace elements in landfill leachate was ranked for 11 soils representing seven soil orders. The most generally mobile elements were chromium, mercury, and nickel; whereas the least mobile elements were lead and copper. The mobility varied with conditions for arsenic, beryllium, cadmium, selenium, vanadium, and zinc. The soil that was most effective in attenuating trace elements was Molokai, and Oxisol from Hawaii. Davidson, an Ultisol from North Carolina, ranked second in its immobilization effectiveness. Both soils are high in clay and extractable free iron oxides. The attenuation of other soils varied but generally ranked according to the amount of clay-sized particles in the soil. (See also W77-02394) (Kreager-FIRL)
W77-02408

U. OF I. URBANA-CHAMPAIGN

NONPOINT-SOURCE POLLUTION IN SURFACE WATERS: ASSOCIATED PROBLEMS AND INVESTIGATIVE TECHNIQUES.
National Environmental Research Center, Las Vegas, Nev. Monitoring Applications Lab.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-243 995, Price codes: A04 in paper copy, A01 in microfiche. Report No. EPA-680/4-75-004, June 1975. 47 p. 2 tab, 44 ref. 22AEB/002.

Descriptors: *Water pollution sources, *Pollutant identification, *Monitoring, *Sampling, Sediments, Runoff forecasting, Pesticides, Nutrients, Forest management, Erosion, Water sampling, Testing procedures, Remote sensing, Agricultural runoff, Acid mine water, Reservoirs, Dredging, On-site data collections, Laboratory tests, Automation.
Identifiers: *Nonpoint pollution sources.

Sediment--over 50% of it cropland runoff--is the principal non-point pollutant. Other contaminants include minerals and acids, pesticides, nutrients such as phosphorus and nitrogen, natural and synthetic organic wastes, heat, pathogenic microorganisms and radioactive materials. These pollutants are caused by food and forage cultivation, animal husbandry, silviculture, mining, construction of facilities, hydrographic modifications, channelization, impoundments, mining gravel from streams and dredging. Techniques are reviewed for predicting the rate and nature of pollution loading to a given waterway from all the major nonpoint-sources. Monitoring strategies and techniques applicable to identification and assessment of nonpoint-source contaminants are analyzed and compared for their utility in state programs aimed at water quality and pollution control. Various procedures are given for manual field sampling, automated sampling, use of automated contact sensors, remote sensors and aerial reconnaisance with a matrix of parameters to be considered in field and laboratory tests for pollutants. (Harris-Wisconsin)
W77-02444

WATER HYACINTHS AND ALLIGATOR WEEDS FOR REMOVAL OF LEAD AND MERCURY FROM POLLUTED WATERS,
National Space Technology Labs., Bay St. Louis, Miss.
For primary bibliographic entry see Field 5G.
W77-02450

RARE EARTH ELEMENT SUPPLY TO THE OCEAN,
Ecole Normale Superieure, Paris (France). Laboratoire de Geologie.
For primary bibliographic entry see Field 2L.
W77-02478

SILVER CONTENT OF PRECIPITATION FROM SEEDED AND NONSEEDED FLORIDA CUMULI,
Virginia Univ., Charlottesville. Dept. of Environmental Sciences.
For primary bibliographic entry see Field 2K.
W77-02485

MONITORING WATER QUALITY FROM LANDSAT.
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 5A.
W77-02494

WATER FOWL REFUGE EFFECT ON WATER QUALITY: I. BACTERIAL POPULATIONS,
New Mexico Inst. of Mining and Technology, Socorro. Dept. of Biology; and New Mexico Inst. of Mining and Technology, Socorro. Dept. of Chemistry.
For primary bibliographic entry see Field 5C.
W77-02513

NUTRIENT DISTRIBUTIONS IN A SPODOSOL DURING CORN GROWTH,
Florida Univ., Gainesville. Dept. of Soil Science.
R. S. Mansell, L. W. Zelazny, L. C. Hammond, and H. M. Selim.
Soil and Crop Science Society of Florida Proceedings, Vol 34, p 24-29, December 1974. 9 fig, 2 tab, 15 ref. OWRT A-026-FLA(3). 14-31-0001-5009.

Descriptors: *Infiltration, Irrigation, Herbicides, Fertilizers, Soils, Kinetics, *Corn(Field), Growth rates, *Nutrients, Distribution, *Path of pollutants, Sorption.
Identifiers: Soil pH, Trickle irrigation, *Spodosol.

Distributions of K, P, NH4-N, and NO3-N in a tile-drained Wauchula sand (Spodosol) were determined under corn cultivation in the spring of 1974. Grain yields of 6,346 and 7,907 kg/ha were obtained from plots receiving 567 and 9,070 kg/ha of limestone, respectively. Nutrient distributions in the soil solution phase were used to describe nutrient movement with time in the soil profile. Movement of NO3-N, NH4-N, K, and Cl proceeded downward in the profile during the first 43 days. However, for times greater than 43 days downward movement of these nutrients did not exceed 50-70 cm depth. Restricted downward transport of nutrients was attributed to the presence of a slowly-permeable B'2t horizon located 75 cm from the soil surface. (Morgan-Florida)
W77-02516

BIO-REFRACTORY INDEX FOR ORGANICS IN WATER,
Connecticut Univ., Storrs. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5A.
W77-02520

MODELING REACTIONS AND TRANSPORT OF POTASSIUM IN SOILS,
Florida Univ., Gainesville. Dept. of Soil Science.
H. M. Selim, R. S. Mansell, and L. W. Zelazny.
Soil Science, Vol. 122, No. 2, p 77-84, 1976. 10 fig, 17 ref. OWRT A-026-FLA(9). 14-34-0001-6010.

Descriptors: Infiltration, Irrigation, Herbicides, Fertilizers, Soils, Kinetics, Sorption, *Potassium, *Path of pollutants, *Mathematical models.
Identifiers: Trickle irrigation.

A mathematical model was developed to describe potassium reactions and transport in soils. Kinetic reactions were assumed to govern the transformation between solution, exchangeable, nonexchangeable (secondary minerals), and primary mineral phases of potassium. Simulated results were presented for two soils, a weakly sorbing soil and a strongly sorbing soil. The effect of kinetic rate coefficients upon transport and transformation of applied potassium was also investigated. The model is flexible and can be adapted to incorporate various transformation mechanisms between the different phases of potassium. Model validation with the aid of experimental data is needed to further describe the fate of potassium in soil. (Morgan-Florida)
W77-02529

DISTRIBUTIONS OF 2,4-D AND WATER IN SOIL DURING INFILTRATION AND REDISTRIBUTION,
Florida Univ., Gainesville. Dept. of Soil Science.
H. M. Selim, R. S. Mansell, and A. Elzeftawy.
Soil Science, Vol 121, No 3, p 176-183, 1976. 10 fig, 22 ref. OWRT A-026-FLA(7). 14-31-0001-5009.

Descriptors: *2-4-D, *Distribution, *Path of pollutants, *Infiltration, Irrigation, Herbicides, Fertilizers, Soils, Kinetics, Sorption, Mathematical models, *Pesticides.
Identifiers: Soil pH, Trickle irrigation.

A numerical model was developed to predict transient water and reactive solute transport in water-unsaturated soil. An implicit-explicit method of finite difference approximation was used to simultaneously solve the water and solute flow equations. The model was used to calculate transport of water and 2,4-D (2,4-Dichlorophenoxyacetic acid) in a field profile of Lakeland fine sand during infiltration at constant intensities (2.08 and 4.10 cm/hr). Calculated values of the soil-water distributions compared well to experimental determinations, but agreement obtained between 2,4-D distributions was only adequate. Simulated results were also obtained to study the effect of irrigation intensity on water and herbicide transport during redistribution following irrigation. It was found that for advanced stages of redistribution, solute movement became negligible and the maximum herbicide concentration was located at the same depth in the soil profile regardless of irrigation intensity. (Morgan-Florida)
W77-02542

AN EXPERIMENTAL HIGH-ASH PAPER MILL SLUDGE LANDFILL: SECOND ANNUAL REPORT,
Michigan State Univ., East Lansing. Div. of Engineering Research.
For primary bibliographic entry see Field 5E.
W77-02555

AN EXPERIMENTAL HIGH-ASH PAPER MILL SLUDGE LANDFILL: FIRST ANNUAL REPORT,
Michigan State Univ., East Lansing. Div. of Engineering Research.
For primary bibliographic entry see Field 5E.
W77-02556

INVESTIGATIONS OF EFFLUENT CHARACTERISTICS FROM CONVENTIONAL AND OXYGEN BLEACHING SEQUENCES: RESULTS OF LABORATORY STUDIES,
National Council of the Pulp and Paper Industry for Air and Stream Improvement, Inc., Gainesville, Fla.
For primary bibliographic entry see Field 5D.
W77-02563

TOXICITY, UPTAKE AND SURVEY STUDIES OF BORON IN THE MARINE ENVIRONMENT,
Fisheries and Marine Service, West Vancouver (British Columbia). Pacific Environment Inst.
For primary bibliographic entry see Field 5C.
W77-02565

5C. Effects Of Pollution

EFFECTS OF SELECTED CHEMICALS ON MOVEMENT, GROWTH AND SURVIVAL OF CERTAIN AQUATIC ANIMAL LIFE,
Kansas Univ., Lawrence. Dept. of Physiology and Cell Biology.
E. C. Bovee
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 388, Price codes: A04 in paper copy, A01 in microfiche. Kansas Water Resources Research Institute, Lawrence, Completion Report, KWRRI Contribution No. 175, July 1976. 64 p, 12 fig, 13 ref, 3 append. OWRT B-040-KAN(1). 14-31-0001-5074.

Descriptors: Aquatic life, *Cadmium, *Calcium, *Cations, *Chemicals, *Chromium, *Copper, Effects, *Iron, *Lead, *Protozoa, *Toxicity, Animal growth, Heavy metals, *Aquatic animals, Water pollution effects.

Identifiers: Adenosine triphosphate, *Alleviation, Interactions, Paramecium, *Selenium, Tetrahymena pyriformis.

Since previous experiments with the protozoan, Tetrahymena pyriformis suggested that cations of heavy metals, (e.g., cadmium, in amounts of one part in 1 million parts of water) which often pollute industrial wastes act on the respiratory mechanisms which generate and store energy in the form of ademosine triphosphate (ATP), research was conducted to determine if certain substances (e.g., other metals) naturally present in freshwaters would counteract the toxic effects of the pollutants. Experiments showed calcium will offset the toxic effects of cadmium, somewhat if present in equal amounts, completely if in much greater amounts than the cadmium. Other experiments showed that iron will completely alleviate toxic effects of copper when the two are present in equal amounts (e.g., 5 to 15 parts per million of each in the water). Iron also proved to be stimulatory to growth (at those concentrations), whether or not the copper was present. Experiments were also done with movement and survival of protoza (e.g., Tetrahymena pyriformis and Paramecium caudatum). Toxic effects were found, but more data are required to determine the exact amounts of those metals which are toxic, and the discrete nature of the toxic effects.
W77-02084

IDENTIFICATION AND QUANTIFICATION OF WATER QUALITY CHANGE INDUCTING MECHANISMS IN STRATIFIED RESERVOIRS,
Tennessee Technological Univ., Cookeville. Dept. of Civil Engineering.
I. A. Gordon.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 366, Price codes: A06 in paper copy, A01 in microfiche. Research Report No. 54, October 6, 1976. 111 p, 46 fig, 22 tab, 62 ref. OWRT A-040-TENN(1). 14-31-0001-5043.

Descriptors: Reservoirs, Water quality, *Eutrophication, Nitrogen, *Dissolved oxygen, Iron, Phosphorus, *Nitrification, Bacteria, *Tennessee, Benthos, Stratification, Settling velocity, Thermocline, Muds, Anaerobic conditions, Manganese, Ammonia.
Identifiers: *Tims Ford Reservoir(Tenn), *Benthic muds.

Several mechanisms causing water quality changes in a deep stratified reservoir were identified and in many cases quantified. These mechanisms included several processes responsible for dissolved oxygen depletion, nitrogen transformations and addition of water quality constituents from the benthic muds. The mechanisms were identified from an analysis of data collected by the Tennessee Valley Authority from Tims Ford Reservoir near Winchester, Tennessee, during 1974 and 1975. Dissolved oxygen depletion occurred in three distinct depth zones and the depletion mechanisms were found to be different in each zone. A major finding was that the depletion in the area of the thermocline was related to increased concentrations of phytoplankton, bacteria and particulate organic matter in this zone. These increased concentrations were caused by a decreasing settling velocity gradient caused by rapidly decreasing temperatures in the thermocline. A model of this process was developed. The nitrogen transformation processes of nitrification, denitrification, ammonification and biological uptake were identified and assessed. Major changes of nitrogen compounds occurred during times of anaerobic conditions in the reservoir hypolimnion. Release rates of water quality constituents from the benthic muds were determined after anaerobic conditions had become established. Phosphorus, ammonia, organic nitrogen, iron and manganese were the major constituents released.
W77-02089

HYGIENIC STANDARDIZATION OF DIETHYLBENZENE IN WATER BODIES, (IN RUSSIAN),
Kiev Research Inst. of General Communal Hygiene (USSR).
For primary bibliographic entry see Field 5G.
W77-02152

CHANGES IN BENTHOS AND FISHES OF A STREAM ACCOMPANYING A SUBSTANTIAL REDUCTION IN PLANT NUTRIENTS,
Pennsylvania State Univ., University Park. Dept. of Biology.
E. L. Cooper, and C. C. Wagner.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 360, Price codes: A02 in paper copy, A01 in microfiche. Pennsylvania Institute for Research on Land and Water Resources, University Park, Completion Report, October, 1976. 17 p, 7 tab, 10 ref. OWRT A-039-PA(1). 14-31-0001-5038.

Descriptors: *Sewage effluents, Streams, *Eutrophication, *Benthos, *Fish, Brown trout, *Nutrient removal, Water pollution effects, *Pennsylvania, Water pollution control.
Identifiers: *Spray irrigation, Terrestrial ecosystems, Aquatic macrophytes, Residual chlorine, Slimy sculpins, Macrophytes, *Spring Creek(Penn).

Disposal of treated domestic sewage effluent into small streams contributes to excessive eutrophication and degradation of beneficial uses. Spring Creek has a recent history of becoming highly eutrophic. Currently, a pumping station and spray-irrigation system is nearing completion that will divert effluent and apply it to a terrestrial ecosystem. This report documents the 1975 status of aquatic macrophytes, benthos, and fishes from sections of Spring Creek, in anticipation of changes which may occur soon after effluent diversion. This before-and-after experiment, measuring changes in the biota, should document the efficacy of procedures of sewage diversion in reversing eutrophication of streams. Macrophytes increased in abundance from the upstream station above the effluent discharge to the station below the State College plant, but were completely absent from the lowest station below the new Houserville plant. Residual chlorine from the Houserville plant may cause the complete absence of plants downstream from this effluent. Conditions in 1975 continue to show marked differences between sections of Spring Creek above and below the sewage effluent discharges, compared with earlier data. Diversion of effluent from the stream should permit rapid recovery to conditions that existed before 1962 when the local sewage plant was greatly enlarged. (Sink-Pennsylvania State)
W77-02191

SYSTEM FOR EVALUATION OF THE HAZARDS OF BULK WATER TRANSPORTATION OF INDUSTRIAL CHEMICALS,
National Academy of Sciences, Washington, D.C. Committee on Hazardous Materials.
For primary bibliographic entry see Field 5G.
W77-02206

FATE AND EFFECTS OF OIL POLLUTANTS IN EXTREMELY COLD MARINE ENVIRONMENTS,
Louisville Univ., Ky.
R. M. Atlas.
Available from the National Technical Information Service, Springfield, VA 22161 as AD/A-003 554, Price codes: A03 in paper copy, A01 in microfiche. Report to Office of Naval Research, 31 December 1974, 36 p., 4 tab., 4 fig., 4 ref. ONR N00014-74A-0180-0001.

Descriptors: *Oil wastes, *Oil pollution, *Degradation, *Microbial degradation, *Chemical degradation, Microbiology, *Toxicity, Bioassay, Oil spill, Photosynthesis, Respiration, Fungi, Alaska, Arctic, *Cold regions, *Environmental effects, Path of pollutants, Marine biology.
Identifiers: *Oil biodegradation, *Alaskan waters, *Prudhoe Crude oil, Marine environment.

The biodegradability of different crude oils depended on their composition and temperature, heavier oils were more resistant to biodegradation, but lighter oils, while more susceptible to degradation at warm temperatures, contained volatile components that inhibited crude oil mineralization at reduced temperatures. It was possible to stimulate degradation of Prudhoe crude oil by fertilization and microbial seeding. Success of stimulated biodegradation depended on providing sufficient nutrients for extensive microbial metabolism in an oleophilic form and on the presence of appropriate oil degrading microorganisms for the given ecosystem. Microbial degradation did not increase toxicity to invertebrates test organisms. Amphipods were only killed by direct physical contact with oil slicks. The seed Pseudomonas sp. was not pathogenic or toxic to the bioassay organisms. Petroleum was found to inhibit microbial photosynthesis and nitrogen fixation, but not respiration. Chronically polluted areas had abnormally high numbers of fungi and low numbers of bacteria. Pristine Alaskan waters all contained microorganisms capable of oil biodegradation. (Katz)
W77-02210

OCCURRENCE OF KEROSENE-LIKE HYDROCARBONS IN THE BREAM, MYLIO AUSTRALIS GUNTHER,
Queensland Dept. of Primary Industries, Hamilton (Australia). Sandy Trout Food Preservation Research Lab.
D. W. Connell, K. Cox, and R. L. McLauchlan.
Australian Journal of Marine and Freshwater Research, Vol. 26, p. 419-422, 1975, 1 tab., 1 fig., 7 ref.

Descriptors: *Water pollution effects, *Oil wastes, *Commercial fish, *Taste, *Organoleptic properties, *Gas chromatography, *Pollutant identification, *Organic compounds, Gas chromatography, Analytical techniques.
Identifiers: *Bream, Mylio australis, *Alkanes.

Samples of the bream, Mylio australis from an area approximately 4 km north of the Brisbane River mouth have been found to contain a mixture of kerosene-like hydrocarbons, probably of petroleum origin rather than generated by internal metabolic processes. Capillary column gas chromatography and gas chromatography coupled with mass spectrometry permitted the unequivocal identification of a series of n-alkanes in this mixture. The kerosene like mixture of hydrocarbons is believed to cause a taint in the flesh of the fish. (Katz)
W77-02212

EFFECT OF ENVIRONMENTAL CONDITIONS ON THE DEGRADATION OF DDT IN MODEL MARINE ECOSYSTEMS,
Cornell Univ., Ithaca, N. Y. Lab. of Soil Microbiology.
F. W. Juengst, Jr., and M. Alexander.
Marine Biology, Vol. 33, p. 1-6, 1975, 4 fig., 13 ref.

Descriptors: *DDT, *DDD, *Model studies, *Environmental effects, *Temperature, *Salinity, *Degradation(Decomposition), *Biodegradation, Ecosystems, *Metabolism, *Algae, *Sediments, Sea water, Analytical techniques, Laboratory tests, Gas chromatography.
Identifiers: *Cylindrospermum sp.

Three model ecosystem types were established, one containing seawater, another having seawater plus 3 to 5 grams sediment, and one in which 75 ml of sediment were covered with seawater sufficient to maintain a free water phase of about 5 mm.

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Each bottle received 3.75 mg of DDT. No products of DDT metabolism were detected in surface seawater at temperatures of 4 deg. to 32C, at various salinities and in the presence or absence of oxygen. DDD was formed from DDT in surface waters supplemented with Cylindrospermum cells, and both DDD and DDE were produced in surface water -sediment model ecosystems receiving organic amendments. Flooded sediments were especially active in converting DDT to DDD, and an unknown compound accumulated in these sediments. None of a series of compounds known to be generated microbiologically from DDT in vitro was observed in the model ecosystems. (Katz)
W77-02213

A NEW TECHNIQUE FOR REMOTE MONITORING OF ACTIVITY OF FRESHWATER INVERTEBRATES WITH SPECIAL REFERENCE OXYGEN CONSUMPTION BY NIAIDS OF ANAX SP. AND SOMATOCHLORA SP. (ODONATA),
Environmental Protection Agency, Grosse Ile, Mich.
W. R. Swain, R. M. Wilson, R. P. Neri, and G. S. Porter.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 503, Price codes: A02 in paper copy, A01 in microfiche. Mimeographed paper, Univ. of Minn. School of Medicine, Duluth, and Lake Superior Basin Studies Center, Duluth, July 1974, 17 p. OWRT B-097-MINN(3).

Descriptors: *Invertebrates, Monitoring, Remote sensing, *Respiration, *Analytical techniques, Dragonflies, Crustaceans, Pollutant identification.
Identifiers: *Oxygen consumption(Niaids), *Anax sp., *Somatochlora sp., Odonata, *Niaids

A new technique is described for remote monitoring of aquatic invertebrate populations which was specifically designed to eliminate effects on organism behavior attendant with other surveillance systems. Specifically, the system described overcomes the necessity for surgical implantation, restrictive weight, and the generation of unnatural activity. This system was used to monitor the activities of a wide variety of aquatic invertebrates ranging in size from crustaceans, 300-600 micro long to dragonfly naiads, 3-5 cm. long. Immature Anax sp. and Somatochlora Sp. were monitored for respiratory activity in relationship to decreasing oxygen tensions. An inverse relationship was observed between respiratory frequency and amplitude of respiration. (Waelti-Minnesota)
W77-02216

THERMAL EFFECTS ON BIODEGRADATION OF POLLUTANTS IN WATER,
Memphis State Univ., Tenn. Dept. of Biology.
For primary bibliographic entry see Field 5B.
W77-02218

EFFECTS ON THE PHOSPHOROUS SITUATION IN LAKE RADASJON ON CHANGES IN THE POLLUTION SITUATION, (IN SWEDISH),
Goteborg Univ. (Sweden). Inst. of Zoology.
L. Henrikson, H. Nyman, and H. Oscarson.
Vatten 31(4), p 398-303, 1975.

Descriptors: *Phosphorus, Lakes, Water pollution effects, Sewage disposal, Waste disposal, Oxygen demand.
Identifiers: *Lake Radasjon(Sweden), Oxygen depletion.

In Lake Radasjon, Sweden (mean depth 8.5 m; area 2.0 km2), the renewal time is 0.2 yr. In July 2972 waste water discharge from 8000-10,000 persons was eliminated from the lake by a waste tube, resulting in a rapid decrease of the total P concentration. The immediate effect of untreated waste water on the total P concentration in the lake was studied twice when the waste tube was damaged. At these times higher values than usual were found in the cove where the waste water was released. The annual total P loading in 1971 was 6.4 g/m2 per yr, in 1973 a.4 g/m2 per yr and in 1975 0.9 g/m2 per yr. This calculated value is probably too high due to deposition of P in lakes upstream of Lake Radasjon. The P loading caused by natural supply exceeds dangerous values. Large parts of the lake bottom occasionally experience O2 deficit and are a potential source of P.A control program to study the total P loading effects in a longer time perspective is being developed.--Copyright 1976, Biological Abstracts, Inc.
W77-02227

BIBLIOGRAPHY OF SOVIET LITERATURE ON FRESHWATER HYDROBIOLOGY AND RELATED PROBLEMS: 1974-1975 (ISSUE 19), (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
For primary bibliographic entry see Field 21.
W77-02232

BIOLOGICAL MONITORING: SUBSTANTIATION AND EXPERIENCE IN ORGANIZATION, (IN RUSSIAN),
Moscow State Univ. (USSR).
For primary bibliographic entry see Field 5A.
W77-02235

THE EFFECT OF CURRENT VELOCITY AND CHANGES IN WATER LEVEL ON THE COMPOSITION OF THE PLANKTONIC CILIATE POPULATION OF THE DANUBE RIVER, (IN HUNGARIAN),
M. C. Bereczyk
Allattani Kozl 62(1-4), p 15-21, 1975.

Descriptors: *Plankton, *Protazoa, *Bacteria, Europe, Velocity, Water levels, Rivers, Water pollution effects.
Identifiers: *Danube River(Hungary), Danubialia, Holotricha, Hungarica, Hungary.

The occurrence of 157 ciliate species in the Hungarian section of the Danube river was studied from 1965-1973. Members of the order Holotricha were dominant in the number of specimens and the number of species. The predaceous and carrion-eating species were dominant earlier, but the bacteria-eating species assumed dominance in the last 3 yr, probably due to pollution. Current velocity below 2 m/s did not inhibit ciliate colonization but flooding did. During floods, the ciliate populations of inlets were only temporarily increased and the number of species and specimens diminshed on the 3rd or 4th day following a flood. The fauna characteristic of the season and the saprobiological condition was evident only when the water level reached 300 cm after a flood.--Copyright 1976, Biological Abstracts, Inc.
W77-02236

TOXICOLOGICAL CHARACTERISTICS OF ACUTE PHENOL INTOXICATION IN SOME FRESHWATER WORMS, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
V. A. Alekseev, and N. E. Uspenskaya.
Gidrobiol Zh 10(4), p 48-55, 1974.

Descriptors: *Phenols, *Worms, *Toxicity, Water pollution effects, Invertebrates, *Oligochaetes, *Tubificids, Temperature.
Identifiers: Chaetogaster-diaphanus, Euplanaria-lugubris, Glossiphonia-complanta, Haemopsis-congerisuga, Helobdella-stagnalis, Herpobedlla-octoculata, Lumbriculus-variegatus, Mesostoma-ehrenbergii, Stylaris-lacustris, Tubifex-tubifex.

Worms possess a higher resistance to acute phenol intoxication than other water invertebrates, except for Turbellaria (Euplanaria lugubris, Mesostoma ehrenbergii) and small Oligochaeta (Stylaria lacustris, Chaetogater diaphanus, Lumbriculus variegatus, Tubifex tubifex) from the family Naididae. At high temperature and starvation conditions, intoxication in Oligochaeta begins earlier and proceeds more intensely. Resistance of adult and young leeches (Herpobdella octoculata, Haemopsis congerisuga, Glossiphonia complanta, Helobdella stagnalis) is almost the same and considerably exceeds that of eggs.--Copyright 1976, Biological Abstracts, Inc.
W77-02237

STUDIES ON THE TOLERANCE OF THE GUPPY, POECILIA RETICULATA (PETERS), A NATURAL ENEMY OF MOSQUITO LARVAE, TO THE SEPTIC POLLUTION OF WATER, (IN JAPANESE),
Teikyo Univ., Hachioji (Japan). Dept. of Parasitology
T. Kurihara, M. Sasa, J. Miyamoto, and H. Sato.
Jpn J Sanit Zool 24(2), p 165-174, 1973.

Descriptors: *Toxicity, Organic matter, Microorganisms, Aeration, Larvae, *Mosquitoes, Oxidation, Water pollution effects, *Hydrogen sulfide, Ammonium
Identifiers: *Poecila-reticulata.

The toxicity of septic waters (containing organic matter and microorganisms) to P. reticulata was highly correlated with the concentration of H2S concentration increased to>1 ppm, and remained so until the concentration dropped to <2 ppm. The pH level during this period was usually below 6, but it gradually changed to near neutral in connection with the increase of NH3 in the water. The septic water also became non-toxic to the fishes after providing aeration for a few hours. Under experimental conditions, H2S dissolved in distilled water was toxic for the fish at concentrations higher than 1 ppm, while the toxicity of NH3 in water was seen at concentrations > 11 ppm. The toxicity of H2S and NH3 was remarkably reduced by mixing the 2 solution at adequate ratios. (NH4)2S was safe for the fish even at 63 ppm, and became toxic only at 125 ppm and higher. The accumulation of H2S produced by microorganisms under anaerobic condition is probably the principal cause of the toxicity, and the subsequent increase of ammonia in water acts as a neutralizing agent. By providing aeration into the septic waters the DO (dissolved O2) concentration rapidly increased, but in most cases the concentration started to drop after several hours, probably due to reproduction of aerobic microorganisms which consume O2 for oxidizing the fouling substances.--Copyright 1976, Biological Abstracts, Inc.
W77-02238

EFFECT OF MINE WASTEWATERS ON THE WATER QUALITY OF THE OL'KHOVOYE RESERVOIR, (IN RUSSIAN),
I. M. Soboleva, V. L. Sinitsin, A. S. Pel'Tikhin, and A. G. Veselyi.
Gidrobiol Zh 11(4), p 101-104, 1975.

Descriptors: Mine wastes, Mine water, Acid mine water, Bacteria, Reservoirs, Water quality, Water pollution effects, Chlorides, Sulfates, Sodium
Identifiers: *Olkovaye Reservoir(USSR), Titer, Ukrainian-SSR, USSR.

The wastewaters of 42 mines flow into the Ol'khovoye River, on which the Ol'khovoye reservoir is located, in the Donetsk Oblast, Ukrainian SSR (USSR) The chemical composition of the mine waters is characterized by high mineralization and high content of chlorides, sulfates and NA+. To improve the water quality of the reservoir, the mine wastewaters should be treated in settling ponds or at local mine-treatment plants, the tributary channels should be cleaned, water-protection belts and zones should be organized, atierosion measures should be implemented and fresh water should be released from the North

pnets-Donbas canal. Analysis of bacterial terotroph content and coli-titer indicated an insive self-purification process in the reservoir.--pyright 1976, Biological Abstracts, Inc.
77-02242

YGIENIC ASPECTS OF A STUDY OF BDELOVIBRIO BACTERIOVORUS AS A NATURAL ACTOR OF SELF-PURIFICATION OF WATER ODIES, (IN RUSSIAN),
stitute of General and Municipal Hygiene, oscow (USSR).
I. Sidorenko, G. A. Bagdasar'Yan, Y. G. laeva, R. M. Abieva, and Z. S. Verklova.
stn Akad Med Nauk Sssr 3, p 52-58, 1975.

escriptors: *Self purification, *Bacteria, nteric bacteria, Public health, Microorganisms, ater pollution, *Viruses, Salmonella, Shigella, oliforms, Microorganisms, Pathogenic bacteria.
entifiers: Adenoviruses, Bacilli, Bacterio, delovibrio-bacteriovorus, DNA, Guinea-pig, ela, Kidney, Mammals, Monkey, Mouse, ages, Picornaviruses, Rabbit, RNA, Salmonelltyphosa, Shigella-sonnei, Typhoid, Vibrio-eltor, ruses, *Black Sea, *Caspian Sea.

nce 1969, wastewaters, surface waters and subrface waters of the temperate climatic zone and e Black and Caspian Seas were examined for the esence of B. bacteriovorus. Presence of thogenic Entero-bacteriaceae, sanitary-indica- microorganisms, enteroviruses and phages of sentery, typhoid and coli bacilli was deterned. The cytopathic effects of 7 strains of B. cteriovorus were studied in monkey kidney and eLa tissue cultures, white mice, rabbits and inea pigs. The strains proved nontoxic and nonulent in LD50 doses to 1 billion. Salmonella phosa and Shigella sonnei isolated from humans d exposed to B. bacteriovorus lost the ability to m colonies on solid media. B. bacteriovorus owed lytic activity with respect to strains of El r vibrios and a pronounced virus-inactivating fect with respect to RNA viruses (enteroviruses) d DNA viruses (adenoviruses). The correlation and between the content of B. bacteriovorus and thogenic microorganisms in fresh and sea ters indicates that it can be used as an indicator water pollution by pathogenic microflora. The npathogenicity of B. bacteriovorus for mamils and the broad spectrum of its lytic activity inate its possible importance in self-purification polluted water, primarily at local treatment nts, particularly for hospital wastewater.--pyright 1976, Biological Abstracts, Inc.
77-02243

CTORS DETERMINING ASPECTS OF FISH RASITOFAUNA FORMATION IN THE KAKOVKA RESERVOIR, (IN RUSSIAN),
ademiya Nauk URSR, Kiev. Instytut Zoologii.
P. Iskov.
lrobiol Zh 11(4), p 69-74, 1975.

scriptors: *Fish parasites, Reservoirs, Rivers, ater pollution, Water temperature, Copepods, pods, Trematodes, Nematodes.
ntifiers: Cestoda, Cnidosporida, *Dnieper er(USSR), *Kakhovka Reservoir(USSR), SR.

h parasitofauna in the Lower Dnieper before its rovement was compared with that in the Kakka reservoir (USSR). The main factors inncing the species composition and degree of asitic infestation of fish are changes in the spes composition and number of hydrobionts due in increase in depth, redistribution of shallow es, water pollution, silting of the water body r, retardation of current velocity and higher er temperatures. Species of Cnidosporidea, matoda, Cestoda, Nematoda, Isopoda and epoda are mentioned.--Copyright 1976, logical Abstracts, Inc.
7-02246

DEVELOPMENT OF THE CHLOROCOCCAL ALGA COELASTRUM MICROPORUM NAEG. IN FISH-BREEDING PONDS, (IN RUSSIAN),
Vsesrossiiskii Nauchno-Issledovatelskii Institut, Prudovogo Rybnogo Khozyaistva, Moscow (USSR).
Z. I. Tsirul'Skaya.
Gidrobiol Zh 11(4), p 87-88, 1975.

Descriptors: *Algae, *Carp, *Fish diseases, Fish stocking, Fish hatcheries.
Identifiers: *Chlorococcal alga, *Coelastrum-microporum.

The timing of the mass development of the chlorococcal alga C. microporum to periods of a summer gill disease of carp of an unknown etiology and the capacity of this species for successful existence when the development of other algal species is largely inhibited can be useful for the timely forecasting and prevention of this disease.--Copyright 1976, Biological Abstracts, Inc.
W77-02248

INFLUENCE OF MERCURY, LEAD, CADMIUM AND COPPER ON PRIMARY PRODUCTION AND PHYTOPLANKTON IN SOME COASTAL AREAS OF THE MEDITERRANEAN AND RED SEAS, (IN RUSSIAN),
A. M. Ibragim, and S. A. Patin.
Okeanologiya 15(5), p 886-890, 1975.

Descriptors: *Cadmium, *Copper, *Lead, *Mercury, Light, *Phytoplankton, *Primary productivity, Coasts, Oceans, Temperature, Water pollution effects, Metals.
Identifiers: Coscinodiscus-granii, *Mediterranean Sea, Nitschia-closterium, Rhizosolenia-alata, *Red Sea.

Series of short- and long-term experiments were made to evaluate the effect of Hg, Cu, Cd and Pb upon the production and specific composition of the coastal phytoplankton in the Mediterranean and the Red Seas at in situ temperatures and light conditions (The initial composition of the phytocenosis was mainly Nitschia closterium, Coscinodiscus granii, Rhizosolenia alota.). The experiments showed a possibility of an essential change of photosynthetic rate and specific composition of phytoplankton natural communities under the action of the concentration of metals close to the natural level in the seawater. N. closterium was most stable to the effect of metals.--Copyright 1976, Biological Abstracts, Inc.
W77-02249

SOME ASPECTS OF THE CHEMICAL COMPOSITION OF TRAPA NATANS L. IN LAKE MAGGIORE (ITALY), ESPECIALLY MANGANESE AND IRON, (IN FRENCH),
European Atomic Energy Community, Ispra (Italy).
R. Gommes, and H. Muntau.
Bull Soc R Bot Belg 108(2), p 209-218, 1975.

Descriptors: Lakes, *Manganese, *Iron, Europe, Chemical wastes, Sediments, Leaves, Roots, Water pollution effects.
Identifiers: Albumin, *Italy, *Trapa-natans, Trapa-natans-ssp-verbanensis, *Lake Maggiore(Italy).

T. natans L. ssp. verbanensis (De Not.) Schintz was collected from 1 of its 6 stations in S Lake Maggiore and analyzed for Ca, Mg, Mn, Fe, Na, K and SiO2. This plant is able to accumulate Mn and Fe in its pinnate roots (Mn, 1.36%, Fe, 3.51%). The lowest concentrations were measured in the albumen (Mn, 12 ppm; Fe, 87 ppm). The Fe/Mn ratio progressively decreases from 2.6 in the roots to 0.5 in the leaves where Mn is selectively accumulated. In the water and sediment from Trapa stations, the Fe/Mn ratio was higher than in other stations in Lake Maggiore; the absolute Mn concentrations are only slightly higher than the mean of the lake. Trapa is able to accumulate Mn, but the Trapa-Mn geobotanical association reported in Russian literature is not confirmed. The higher Mn and, especially, Fe concentrations may be due to the decomposing Trapa itself.--Copyright 1976, Biological Abstracts, Inc.
W77-02250

EFFECT OF EXOGENOUS AMINO ACIDS ON PRODUCTIVITY OF CERTAIN HIGHER HYDROPHYTES, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
N. N. Smirnova.
Gidrobiol Zh 11(4), p 47-53, 1975.

Descriptors: *Amino acids, Aquatic plants, Self purification, *Productivity, Organic compounds, Pondweeds.
Identifiers: Exogenous amino acids, Phragmites-communis, Potamogeton-perfoliatus, Spirodela-polyrrhiza.

Experiments performed to elucidate the effect of different concentrations of exogenic amino acids (alanine, glutamic acid and tryptophan) on higher hydrophytes (Phragmites communis Trin.) showed that hydrophyte productivity depends on the chemical nature of the amino acid, its concentration and the biological peculiarities of the plant. Spirodela polyrrihiza and P. communis endured higher concentrations of exogenous amino acids than Potamogeton perfoliatus. This indicates that the 2 former species have a more important role in the self-purification of bodies of water of organic components, including amino acids.--Copyright 1976, Biological Abstracts, Inc.
W77-02251

PRODUCTION OF PHYTOPLANKTON OF LAKE BAIKAL IN THE REGION OF LISTVENNICHNOYE VILLAGE, (IN RUSSIAN),
Akademiya Nauk SSSR, Leningrad. Zoologicheskii Institut.
V. V. Bul'On.
Dokl Akad Nauk Sssr Ser Biol 223(3), p 737-740, 1975.

Descriptors: *Phytoplankton, *Chlorophyll, Lakes, Asia, *Photosynthesis, Carbon, Water temperature.
Identifiers: Listvennichnoye, USSR, Lake Baikal(USSR), Carbon assimilation.

Phytoplankton in the southern part of Lake Baikal, near Listvenichnoye village (USSR), is distinguished by exceptionally weak photosynthetic activity. The average rate of assimilation of C was only 5 mg C/1 mg chlorophyll day at an average chlorophyll content of 1 microgram/1. Photosynthesis occurred at a maximum rate at a water temperature of about 9C.--Copyright 1976, Biological Abstracts, Inc.
W77-02253

CHEMICAL COMPOSITION OF BLUE-GREEN ALGAE IN THE KREMENCHUG RESERVOIR, (IN RUSSIAN),
Tekhnologicheskii Institut Pishchevoi i Kholodilnoi Promyshlennosti, Odessa (USSR).
V. A. Peskov, I. V. Areshidze, and M. S. Dudkin.
Gidrobiol Zh 11(4), p 93-95, 1975.

Descriptors: *Cyanophyta, *Algae, Reservoir, Carbohydrates, Hydrolysis, Europe, Sampling.
Identifiers: *Anabaena-affinis, *Aphanizomenon-flos-aquae, *Kremenchug Reservoir(USSR), *Microcystis-aeruginosa, *Microcystis-Wesenbergii, Reservoir, *Saccharides, Ukrainian-Ssr, USSR.

The chemical composition of blue-green algae collected in the Kremenchug reservoir on the Dnieper River (Ukrainian SSR, USSR) in July-Aug. 1971-1972 was investigated. The 6 samples contained

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varying percentages of Microcystis aeruginosa, Aphanizomenon flostaquae, Microcystis wesenbergii, Anabaena affinis (other species in the samples ranged from 1-10%). The samples contained comparatively small content of carbohydrates (14.3-23.6% of dry matter). The polysaccharides were readily hydrolyzed and consisted of galactose, glucose, arabinose, mannose, xylose, ribose, rhamnose, glucuronic acid and other monosaccharides (the 1st 5 comprised 81-83% of the total sugar in the hydrolysate).--Copyright 1976, Biological Abstracts, Inc.
W77-02254

GROWTH FACTORS ON OYSTER AND WATER POLLUTION IN SOUTH COASTAL AREA IN KOREA, (IN KOREAN),
Yonsei Univ., Seoul (Republic of Korea). Inst. of Environment Pollution Research.
M. K. Chynung, S. K. Chun, K. I. Yu, and S. P. Kwon.
J Natl Acad Sci Repub Korea Nat Sci Ser 13, p 319-340. 1974.

Descriptors: *Growth stages, *Growth rates, *Oysters, Asia, Coasts, Water pollution effects, *Animal parasites, *Mortality, Plankton.
Identifiers: Bucephalus-sp, Cestoda, Flagellata, *South Korea.

To investigate the factors affecting the growth of oysters, rainfall, water quality, plankton distribution and numbers of parasites (e.g. Flagellata, Bucephalus sp., Cestoda) were measured from July-Dec. 1973. This study of growth factors revealed a high mortality rate among the oysters from Sept.-Oct.--Copyright 1976, Biological Abstracts, Inc.
W77-02257

THE EFFECT OF BOTTOM SEDIMENTS ON FORMATION OF SURFACE WATER COMPOSITION, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
For primary bibliographic entry see Field 5B.
W77-02259

ELEMENTS OF LIMNOLOGICAL SPECIFICITY OF LARGE LAKES IN THE TEMPERATE ZONE, (IN RUSSIAN),
Akademiya Nauk SSSR, Leningrad. Institut Ozerovedeniya.
For primary bibliographic entry see Field 2H.
W77-02260

EFFECT OF RIVER POLLUTION ON AQUATIC BEETLES, (IN RUSSIAN),
Rostov-na-Donu Research Inst. of Neurocybernetics (USSR).
For primary bibliographic entry see Field 5A.
W77-02261

MAXIMUM ALLOWABLE CONCENTRATION OF LEAD IN SURFACE WATERS, (IN RUSSIAN),
Sverdlovsk Research Inst. of Industrial Hygiene and Occupational Disease (USSR).
M. S. Sadilova, K. P. Selyankina, E. A. Borzunova, and L. N. El'Nichnykh.
Gig Sanit 5, p 101-102, 1975.

Descriptors: *Lead, Surface water, Water supply, Lethal limit, Rodents, Water pollution effects, Water quality standards, Toxicity, Inhibition.

To refine the maximum allowable concentration (MAC) of Pb in water, chronic sanitary-toxicological experiments were performed on albino rats which received daily for 7 mo. an oral Pb dose of 0.005 mg/kg, which corresponded to its MAC in water (0.1 mg/l). This Pb dose led to a statistically significant increase of Pb content in bone, brain and liver. During the prolonged intake of Pb at the MAC for water the functional state of the CNS was disturbed. The blood pyruvic acid concentration increased, which confirmed the inhibiting effect of Pb on the activity of enzymes of carbohydrate metabolism, especially carboxylase. The adopted MAC of Pb in water is possibly too high and should be reduced from 0.1 to 0.05 mg/l.--Copyright 1976, Biological Abstracts, Inc.
W77-02262

DYNAMICS OF THE CONTENT OF SOME ORGANIC TOXIC SUBSTANCES IN PLANTS IRRIGATED WITH EFFLUENTS OF THE COAL-TAR CHEMICAL INDUSTRY, (IN RUSSIAN),
Kiev Inst. of Nutritional Hygiene (USSR).
L. R. Polishchuk.
Gig Sanit 4, p 117-119, 1975.

Descriptors: *Industrial wastes, Water reuse, *Toxicity, *Organic wastes, *Chemical wastes, Coal tar coatings, Irrigation, Potatoes, Corn(Field), Effluents, Soils.
Identifiers: *Coal-tar chemical wastes.

To study the migration of individual toxic ingredients of effluents of coal-tar chemical factories (mono- and polyatomic phenols, pyridine, naphthalene, benzene) from soil into plants, the presence of these substances was determined in potatoes and corn grown on experimental plots irrigated with the effluents in various concentrations. The dynamics of the accumulation and breakdown of these substances were established. Plants and soils are both powerful means of detoxification of certain organic compounds.--Copyright 1976, Biological Abstracts, Inc.
W77-02263

THE INFLUENCE OF WASTE WATERS ON ALGAE IN THE OPEN COLLECTOR OF ZAGREB AT IVANJA RIJEKA, (IN CROATIAN),
Zagreb Univ. (Yugoslavia). Institut za Biologijo.
M. Tomec, Z. Pavletic, and I. Munjko.
Acta Botanica Croatica, 34, p 53-62, 1975.

Descriptors: *Algae, Water pollution effects, Aeration, Industrial wastes, Municipal wastes, Organic loading, Activated sludge, *Waste water treatment.
Identifiers: Ivanja, Rijeka, *Zagreb(Yugoslavia), Ivanja Rijeka(Yugoslavia).

The water from the main collector the city of Zagreb, Yugoslavia, is loaded with industrial and municipal wastes. To protect underground and surface waters in that region, these waters should not be allowed to flow into the Sava River without being purified. In addition to the great organic and inorganic load of the collector waters, 70 spp. of algae were found, which probably originated in brook-waters of Zagrebacka gora. A smaller number of algae (5-15) are otherwise relatively frequent in the collector water. The number of algae found in the water after the reception of waste waters was considerably decreased. The microflora in the collector water was very active in the waste organic matter mineralization process, especially in summer, and are used in activated sludge aeration and dephenolization treatment. A reliable test is needed for establishing harmful effects of industrial waste waters on algae and other organisms in receiving waters.--Copyright 1976, Biological Abstracts, Inc.
W77-02268

THE EFFECT OF WATER WITH DIFFERENT MINERALIZATION LEVELS ON THE ANIMAL BODY, (IN RUSSIAN),
Meditsinskii Institut, Kiev (USSR).
R. D. Gabovich, and N. F. Uzhva.
Gig Sanit 10, p 25-29, 1975.

Descriptors: *Mineralogy, *Aging(Biological), *Metabolism, Potable water, Rodents, *Salts.

Water of different mineralization levels (40-2000 mg/l) had a pronounced effect on the metabolism and distribution of the investigated microelements in various organs. The most unfavorable shifts were noted in animals (rats) drinking water with a high salt content (2000 mg/l). In these animals physiological aging processes were accelerated.--Copyright 1976, Biological Abstracts, Inc.
W77-02270

SURVEYING AMERICA'S LAKES.
Environmental Science and Technology, Vol. 10, No. 9, p 862-864, September, 1976.

Descriptors: *Lakes, *Eutrophication, *Surveys, *Nutrients, *Phosphorus, Surface waters, Minnesota, *United States, Lime, Chemical precipitation, Waste water treatment, Municipal wastes, Treatment facilities, Tertiary treatment, Efficiencies, Evaluation, Algae, Algal control, *Water pollution treatment.

Preliminary results from a eutrophication survey of America's lakes are reported along with an example of how some lakes may be restored to higher quality. According to the National Eutrophication Survey, approximately 80% of the lakes and reservoirs in the eastern United States are eutrophic. Shagawa Lake, adjacent to the city of Ely, Minnesota, is an example of a eutrophic lake that has been partially restored by the removal of the algal growth-promoting nutrient phosphorus. The lake originally became eutrophic as a result of the city of Ely discharging its municipal waste water into it. The installation of a tertiary treatment system at the city's waste water treatment plant resulted in more than 99% removal of phosphorus from the effluent and a decline in eutrophic activity of Shagawa Lake. The effluent flowing into the lake contains only 0.05 milligrams/liter of phosphorus. Although the lake is in the process of repairing itself, it has not yet reached equilibrium, probably because of feedback mechanisms involving internal sources of phosphorus which may be retarding the restoration process. However, the project has demonstrated that phosphorus levels as low as 0.05 milligrams/liter can be achieved through lime precipitation. (Kreager-FIRL)
W77-02375

SOYBEAN YIELD RESPONSES AND ASSIMILATION OF ZN AND CD FROM SEWAGE SLUDGE-AMENDED SOIL.
Illinois Univ. at Urbana-Champaign. Dept. of Agronomy.
T. D. Hinesly, R. L. Jones, J. J. Tyler, and E. L. Ziegler
Journal Water Pollution Control Federation, Vol 48, No. 9, p 2137-2152, September, 1976. 5 fig, 5 tab, 13 ref.

Descriptors: *Sewage sludge, *Soil amendments, *Heavy metals, *Crop response, *Waste disposal, Phytotoxicity, Crops, *Zinc, *Cadmium, Phosphorus, Irrigation, Symbiosis, Sludge disposal, Municipal wastes.

A 6-year study of the effects of irrigating soybean plots with municipal sludge was performed. Applications of digested sludge significantly increased soil levels of zinc and cadium which were reflected by increased concentrations of these metals in plant tissues. However, there were no indications that the absorption and translocation of relatively large amounts of these metals into leaves, petioles, and seeds had caused a phytotoxic condition. Only large amounts of phosphorus as a constituent of sludge caused a yield depression during one growing season, and the phosphorus-induced phytotoxic conditions were rapidly dissipated after sludge applications were suspended. During the following growing season, soybean yields were significantly higher on maximum sludge-treated plots than on fertile control plots. Accumulative applications of sludge affected zinc and cadmium concentrations

n soybean tissues to a lesser extent than did a par-
icular annual application rate. Thus, if phytotoxic
onditions develop as a result of zinc and cadmium
ccumulation in soils amended with sludge over
everal years, they are expected to occur during
he time of sludge application rather than after the
pplications have been terminated as suggested by
ther investigators. (Kreager-FIRL)
V77-02377

**'HE EFFECT OF SUB-LETHAL LEAD CON-
ENTRATIONS ON THE CHEMORECEPTORS
)F TWO FRESH WATER FISH SPECIES, (IN
ERMAN),**
Stuttgart Univ. (West Germany). Institut fuer
iedlungswasserbau und Wasserguetewirtschaft.
. Haider.
Hydrobiologia 47(2), p 291-300, 1975.

Descriptors: *Lead, *Catfish, Lethal limit, Fresh-
vater fish, Water pollution effects.
dentifiers: Ameiurus-nebulosus, Histology,
ublethal concentrations, Tinca-tinca, *Tench,
Chemoreceptors(Fish), *Lead acetate.

ublethal concentrations of lead acetate damage
he chemoreceptors of the common catfish
Ameiurus nebulosus) and the tench (Tinca tinca).
Histological examinations reveal erosion of the
erminal buds.
V77-02383

**EFFECT OF POLYVINYL CHLORIDE ON
VATER MICROFLORA, (IN RUSSIAN),**
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gi-
ieni i Toksikologii Pestitsidov, Kiev (USSR).
. O. Sheftel', Z. S. Tsam, and I. D. Bliznyuk.
Gig Sanit 4, p 99-100, 1975.

Descriptors: Water pollution effects, Pipes,
Plastic pipes, Algae, Bacteria, *Cyanophyta,
Enteric bacteria, Iron, Rotifer, Fungi, *Iron bac-
eria, Flora.
dentifiers: Infusoria, *Polyvinyl chloride.

Well stabilized polyvinyl chloride water pipes do
ot release low-molecular weight compounds into
vater and do not stimulate the development of
vater microflora (enteric bacteria, blue-green
lgae, Fe-bacteria, Inufusoria, fungi, rotifers).--
Copyright 1976, Biological Abstracts, Inc.
V77-02386

**NTERACTIONS OF FERRIC AND FERROUS
RONS AND ORGANIC MATTER IN WATER
NVIRONMENT,**
Tokyo Metropolitan Univ. (Japan). Dept. of
Chemistry.
For primary bibliographic entry see Field 5B.
V77-02389

**ROP RESPONSE TO TANK TRUCK APPLICA-
ION OF LIQUID SLUDGE,**
all State Univ., Muncie, Ind. Dept. of Natural
esources.
.. A. Kelling, L. M. Walsh, and A. E. Peterson.
ournal Water Pollution Control Federation, Vol.
3, No. 9, p 2190-2197, September, 1976. 3 tab, 22
ef.

escriptors: *Sludge, *Soil amendments, *Crop
esponse, *Sludge disposal, *Fertilizers, Nitrogen,
hosphorus, Waste disposal, Symbiosis, Liquid
astes, Plant growth.

he effects of repeated tank truck applications of
quid sludge on experimental plots of alfalfa,
orn, and sorghum-sudan were investigated.
udge applications of 5 cm usually provided
elds of corn and sorghum-sudan which were
quivalent to those obtained with a moderately
gh rate of commercial fertilizer when these crops
ere planted in the growing season following
udge application. Sludge applications of up to 15
cm did not reduce crop yields and in fact generally resulted in maximum yields and nitrogen uptake. Substantial residual benefits from sludge were observed at sludge applications as low as 5 cm for sorghum-sudan and 10 cm for corn, whereas no such residual response was observed when commercial fertilizer was applied. Repeated tank truck traffic on established alfalfa plots severely reduced crown survival and subsequent yields, and liquid sludge application by this method is not recommended for such plots. Nitrogen and phosphorus recoveries by corn and sorghum-sudan were relatively low in sludge-treated plots. (Kreager-FIRL)
W77-02390

SOLID WASTE DEGRADATION DUE TO SHREDDING AND SLUDGE ADDITION,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5E.
W77-02412

CASE HISTORY OF LANDFILL GAS MOVEMENT THROUGH SOILS,
Cook Coll., New Brnswick, N. J.
For primary bibliographic entry see Field 5E.
W77-02413

ZOOPLANKTON OF THE REGION OF NOSY-BE: VI. PTEROPODS, HETEROPODS: I. HOLONERITIC AND INTERNAL-NERITIC SPECIES; CONTRIBUTION TO THE STUDY OF A TROPICAL EUTROPHIC BAY, (IN FRENCH),
Office de la Recherche Scientifique et Technique Outre-Mer, Nosy-Be (Madagascar). Centre Oceanographique (ORSTOM) de Nosy-Be.
S. Frontier.
CAH O R S T O M SER OCEANOGR 11(3), p 273-289, 1973.

Descriptors: *Zooplankton, *Bays, *Eutrophication, Water pollution effects, Predators, Phytoplankton, Tropical regions, Morphology, Seasonal.
Identifiers: Atlanta-Gaudichaudi, Creseis-Acicula, Creseis-Chierchiae, Heteropods, Malagasy-Republic, *Nosy-Be, Pneumopdermopsis-Sp, Pteropods.

Pneumopdermopsis sp. a predator of Creseis acicula can only be found very near the coast and shows an annual cycle parrallel to its prey. C. chierchiae shows, on the average, an abundance decrease from the coast to the continental slope, but its annual cycle differs widely from that of C. acicula. The decrease during the dry season, which is less and less marked from the slope toward the bays, reveals only the back flow of the internal neritic water towards the coast at this time of the year. In the bays the abundance reaches its maximum in the dry season. The species is composed of 2 forms which are probably phenotypic: one with a thin ribbed shell, which is strictly internal neritic, and the other with a smooth thick shell which is external neritic. Some specimens which are morphologically intermediate can be found in small quantities when the 2 settlements meet. Atlanta gaudichaudi is found on the whole continental shelf as well as in the waters of the open sea. The young forms appear to be neritic showing an abundance maximum in the set season, when the phytoplankton and the phytophagic zooplankton are abundant. The adults may feed on bigger prey and show less selective distribution.--Copyright 1976, Biological Abstracts, Inc.
W77-02416

DETRITAL UTILIZATION BY THE POLYCHAETE, CAPITELLA CAPITATA,
Woods Hole Oceanographic Institution, Mass. Dept. of Biology.
K. R. Tenore.
Journal of Marine Research, Vol. 33, No. 3, p. 261-274, 1975. 4 fig., 4 tab., 39 ref. NSF GA-39911.

Descriptors: *Annelids, *Detritus, *Decomposing organic matter, *Food chains, Radioisotopes, Tracers, Particle size, Coasts, Estuaries, Marine animals, Energy budget, Laboratory tests.
Identifiers: *Polychaetes, *Capitella capitata, Eel grass, Zostera marina, Carbon-14.

Little quantitative data is available on rates of utilization of organic detritus, an important energy source in marine ecosystems, by deposit feeders, in part because of the difficulty of using isotope tracer techniques due to the release and recycling of such labels as carbon-14. This study investigated the effect of initial particle size and aging of detrital eel grass on net incorporation by the polychaete, Capitella capitata, using controls to account for isotope tracer errors due to leaching of carbon-14. Results showed an increase in the rate of incorporation with increasing detritus age for all particle sizes. For the first two periods of aging (0 and 11 days) there was a greater incorporation of the finest size detritus while the later periods revealed a greater incorporation of larger size detritus. Decay experiments with detritus showed an initial rapid decrease then a slower rate of increase in nitrogen content and corresponding changes in C:N ratios. Observed differences illustrate the need for considering the qualitative state of detritus used in growth experiments. In addition, the long decay time associated with seagrasses versus shorter decay periods of detritus from other sources would prolong the availability of the detrital food resource by expanding the temporal period of utilization of the total detrital pool. (Luedtke-Wisconsin)
W77-02435

ALGAL METABOLITE INFLUENCE ON BLOOM SEQUENCE IN EUTROPHIED FRESHWATER PONDS,
Haskins Labs., Inc., New Haven, Conn. Orsborn Memorial Lab.
K. I. Keating.
Report No. EPA-600/3-76-081, July 1976. 155 p. 26 fig., 14 tab., 144 ref. RA 801387.

Descriptors: *Inhibition, *Cyanophyta, *Diatoms, *Plant growth regulators, *Plant growth substances, *Algal control, *Succession, Zooplankton, *Connecticut, *Eutrophication, Silica, Water pollution effects.
Identifiers: Linsley Pond(Conn).

Biological sequence control of algal blooms is suggested as a relatively-inexpensive method of water quality management in moderately-sized eutrophic lakes as a practical alternative and/or adjunct to nutrient removal. Monitoring of bloom sequence in Linsley Pond, Connecticut for three years, accompanied by laboratory studies showed that certain extracellular metabolites in blue-green algae substantially inhibit the growth of planktonic diatoms in cultures and in the pond's natural sequence. A hypothetical sequence control strategy is offered, with a projected cost of about $500 per year for a pond similar to the study site. Using the strategy, winter blue-green blooms would be eliminated by copper sulfate and spring diatom growth enhanced by the addition of silica. The silica would enhance the diatom growth and some other desirable forms and would lessen the effect of the remaining blue-green metabolite inhibition. Such efforts should then increase the period of diatom domination, decrease nutrient levels left in the epilimnion when the diatoms senesce, and decrease the subsequent late summer blue-green bloom. Details are given of the in situ and of the laboratory tests. (Harris-Wisconsin)
W77-02438

OZONE AND VASCULAR TISSUE DIFFERENTIATION IN PLANTS,
Howard Univ., Washington, D.C. Dept. of Botany.
J. P. Rier.
Report No. EPA-600/3-76-068, May 1976. 32 p. 4 fig., 35 ref. 1A1006/1HA323. R-801209.

U. OF I. URBANA-CHAMPAIGN

Descriptors: *Ozone, *Vascular tissues, Oxidation, Oxygen, Plant morphology, Xylem, Plant physiology, Phloem, Cellulose, Lignins, Enzymes, Proteins, Plant growth regulators.
Identifiers: *Xylem regeneration, *Indoleacetic acid, *Dichlorophenoxyacetic acid, Callus tissues, Plant internodes, Coleus blumei(Benth).

Vascular tissues of Coleus blumei (Benth) show alterations in both quantity and quality upon exposure to ozone, the heavy oxygen that is a common constituent of airborne pollution. Laboratory tests of xylem regeneration around wounded plant internodes showed that ozone-induced xylogenesis is reduced more in internodes grown in indoleacetic acid (IAA) than in dichlorophenoxyacetic acid. As a corollary, the substitution of the latter for IAA in media where sucrose also is present has a mitigating effect on the action of ozone in the xylem regeneration process. Preliminary findings also suggest that ozone has an influence on the protein and enzyme patterns in callus tissues exposed to the pollutant. The results support a supposition that plant internodes and callus tissues can both be used to study ozone effects on certain plant growth and development processes, including: (1) phloem differentiation; (2) cellulose and lignin production; (3) plant membrane integrity; (4) quantity and quality of proteins and enzymes in growing and differentiating plant tissues, and (5) the effectiveness of growth regulators in the presence of ozone. (Harris-Wisconsin)
W77-02439

PHOSPHATE REDUCTION AND RESPONSE OF PLANKTON POPULATIONS IN KOOTENAY LAKE,
Washington State Univ., Pullman.
R. A. Parker.
Report No. EPA-600/3-76-063, May 1976. 70 p. 29 fig., 5 tab., 40 ref., append. R-800430.

Descriptors: *Nutrient removal, *Phosphates, *Lakes, *Biological communities, Zooplankton, Phytoplankton, *Canada, Dams, Nitrogen, Diatoms, Daphnia, Cyanophyta, Simulation analysis, Columbia River, Hydrodynamics, Water temperature, Secchi disks, *Montana.
Identifiers: *Phosphate load reduction, *Lake Kootenay(British Columbia), Kootenay River(British Columbia), Libby Dam(Mont).

Although only a 10-15% decrease in chlorophyll-a levels were found in Kootenay Lake, British Columbia, after the soluble inorganic phosphate entering the lake was reduced 90%, important changes were recorded in the species composition of the phytoplankton population, with diatoms playing an increasingly important role relative to blue green algae. However, these changes may have been partially affected also by the completion in 1972 of the Libby Dam in Montana, upstream from the lake on the Columbia River system. Kootenay, a large and oligotrophic lake, received significant quantities of inorganic phosphate by way of the Kootenay River for 13 years prior to 1969. Post-phosphate reduction measurements were made in 1971-75, analyzing temperature, transparency, inorganic and organic phosphate, nitrate, ammonium, chlorophyll-a, copepods and cladocerans. The measurements were compared with results from limnological studies that were made of Kootenay before 1969, which emphasized nutrient levels, plankton densities, phytoplankton composition and associated parameters. Other results show that one genus of zooplankton, Daphnia, has virtually disappeared although total zooplankton levels have not changed. Primary production changed from nitrogen-limited in 1969 to phosphate-limited in 1971. A model was developed from the 1966-69 data when the phosphate input was high to predict the consequences of reduced phosphate input. (Harris-Wisconsin)
W77-02440

NITRATE REMOVAL FROM WATER AT THE WATER-MUD INTERFACE IN WETLANDS,
Louisiana Agricultural Experiment Station, Baton Rouge.
For primary bibliographic entry see Field 5G.
W77-02441

STUDIES ON LAKE RESTORATION BY PHOSPHORUS INACTIVATION,
Corvallis Environmental Research Lab., Oregon.
For primary bibliographic entry see Field 5G.
W77-02442

MATHEMATICAL MODELING OF PHYTOPLANKTON IN LAKE ONTARIO. PART 2. SIMULATIONS USING LAKE 1 MODEL,
Manhattan Coll., Bronx, N. Y. Environmental Engineering and Science Program.
R. V. Thomann, R. P. Winfield, D. M. Di Toro, and D. J. O'Connor.
Report No. EPA-600/3-76-065, August 1976. 96 p. 17 fig., 11 tab., 15 ref. R-800610

Descriptors: *Simulation analysis, *Lake Ontario, *Phytoplankton, *Nutrients, Model studies, Mathematical studies, Mathematical models, Biomass, Productivity, Chlorophyll, Phosphorus, Nitrogen, Optimization, Probability, Great Lakes.
Identifiers: US-Canada Water Quality Agreement.

Simulations of the response of the open lake region of Lake Ontario to various levels of nutrient input, using a model developed in an earlier part of the study, tend to indicate that maximum point-source nutrient control for that part of the lake will be only a holding action and not a significant improvement in water quality parameters, because of projected difficulties in achieving measurable reductions below present levels of phytoplankton biomass beyond the near-shore zone. Simulations used a simplified dynamic model of phytoplankton-nutrient interactions in a vertically-segmented structure and assumed a horizontally well-mixed lake. Simulations assumed four different load conditions of phosphorus input as against two assumed loadings of nitrogen input. Results indicate that if the present input nutrient load is continued, spring peak phytoplankton chlorophyll level in the epilimnion will continue to increase to a new level about 45% higher than the present one. By comparison, a retrospective simulation with pastoral load estimates shows that spring phytoplankton levels were some 40% less than at present, prior to the onset of man's intensive activity level around the lake. (See also W76-11286 and W75-07700) (Harris-Wisconsin)
W77-02443

BIOLOGY OF BLUE-GREEN ALGAE OF TIDE MARSHES,
Delaware Univ., Lewes. Coll. of Marine Studies.
G. F. Somers.
Available from the National Technical Information Service, Springfield, VA 22161 as COM-75-11091, Price codes: A04 in paper copy, A01 in microfiche. Report No. DEL-SG-14-75, 1975. 64 p. 8 fig., 16 tab., 37 ref. OSG 2-35223.

Descriptors: *Tidal marshes, *Cyanophyta, Calcium, Brackish water, Plant ecology, *Delaware, Estuarine environment, Ions, Water pollution effects, Eutrophication.
Identifiers: *Calcium ion binding, Calcium cycling, St. Jones Marsh(Del), Canary Creek Marsh(Del), Cape Henlopen(Del), Big Nose Island(Del).

Dead cells of blue-green algae from laboratory cultures as well as those harvested from a tidal marsh, have a substantial capacity to bind calcium ions--a capacity in algae from a natural habitat exceeding that of the cell walls of rhizomes of Spartina alterniflora with which it might be in competition. At least in brackish waters these algae cells retain a substantial portion of the calcium ions and this is readily exchanged with the ambient medi um. Algal cells could then contribute to calcium cycling by exchange reactions, with moribund o dead cells serving as a temporary reservoir of thi cation. No quantitative measurement was made o this potential, but a qualitative assessment base on visual estimation of mass and seasona abundance suggests that the blue-green algae ma well contribute to the calcium cycling of a tide marsh by uptake during periods of rapid growt and of release during their demise. Total mass o the algae may be insufficient, however, to con tribute substantially to the calcium needs of th marsh environment. There is a possibility that similar role in calcium ion binding may be playe by other algae that are abundant during th seasons when blue-green algae are not con spicuous. (Harris-Wisconsin)
W77-02446

ANALYSIS OF POLLUTION FROM MARINI ENGINES AND EFFECTS ON THE ENVIRON MENT. SUMMARY REPORT.
Boating Industry Associations, Chicago, Ill.
Available from the National Technical Informa tion Service, Springfield, VA 22161 as PB-242 177 Price codes: A04 in paper copy, A01 in microfiche Report No. EPA-670/2-75-064, June 1975. 69 p. fig., 10 tab., 15 ref. 1BB038, R-801799.

Descriptors: *Water pollution effects, *Boats Biota, Fish, Oil pollution, Carbon dioxide, Car bon, Aquatic plants, Photosynthesis, Lead, Fuels Gasoline, Aromatic compounds, Michigan Florida.
Identifiers: *Outboard motor emissions, Carbo monoxide, Hydrocarbon, Ann Arbor(Mich) Gainesville(Fla).

Outboard motor emissions were not found to sig nificantly affect aquatic ecosystems, in a study i which four ponds were subjected to use by out board marine engines calculated to be three time greater than the level extant with saturation boat ing. Certain marginal changes in lake biota wer found but it was not certain whether these resulte from natural effects or from the stress created b the engines. In a laboratory phase of the stud conducted by the departments of Civil an Mechanical Engineering of the University c Michigan, carbon monoxide at near-saturatio levels did not kill fish. Aromatic compounds suc as toluene have an evaporation half-life of 11 day in a lake or other water body, assuming quiescenc and uniform distribution to an initial depth of on meter. However, there is uncertainty concernin the build-up of lead in bottom sediments as a resul of outboard engine operation using leaded fuel an the effect of carbon dioxide in carbon-limite lakes. Phytoplankton carbon fixation appeared t be reduced and differences were noted in th production of biomass and chlorophyll-a. (Harris Wisconsin)
W77-02449

NUTRITIONAL ECOLOGY OF NUISANC AQUATIC PLANTS,
Wisconsin Univ., Madison. Dept. of Botany.
G. C. Gerloff.
Available from the National Technical Informa tion Service, Springfield, Va 22161 as PB-244 263 Price codes: A05 in paper copy, A01 in microfiche Report No. EPA-660/3-75-027, June 1975. 86 p. 1 fig., 24 tab., 38 ref. 21AJF 005, R-800504

Descriptors: *Analytical techniques, *Bioassay *Nutrients, *Nutrient requirements, *Aquatic plants, *Aquatic algae, Anabaena, Competition Absorption, Plant growth, Nitrogen, Phosphorus Potassium, Copper, Testing procedures, Trace elements, Limiting factors, Wisconsin
Identifiers: Plant analysis, Myriophyllum spicatum, Ceratophyllum demersum, Elodea oc cidentalis, Draparnaldia plumosa, Lemna minor Stigeoclonium tenue, Microcystis aeruginosa

A method for determining the trophic level and growth-limiting nutrients of waters by plant analysis is proposed. The detailed technique indicated that potassium, rather than nitrogen or phosphorus, becomes the limiting factor for the growth of the macrophytes Myriophyllum spicatum and Ceratophyllum demersum in a shallow eutrophic Wisconsin lake. Plant analysis data also indicate that critical concentrations of an element--the minimum or slightly less than the minimum concentration which will permit maximum plant yield and growth--can vary considerably among different organisms, to the extent that similar critical values cannot be generally applied even within a single taxonomic group. A technique developed for comparing aggressiveness and competitiveness among organisms in nutrient uptake is suggested for further testing, particularly among major nuisance plants. More tests are also suggested for measuring the possibility that inorganic nutrients other than nitrogen and phosphorus can be critical in nuisance plant growth. Suggested procedures are: (1) Measuring competition among several organisms in the culture for a growth-limiting amount of a specific nutrient; (2) measuring nutrient replacement in cultures to establish the border-line concentration at which an organism failed to achieve maximum growth regardless of the adequacy of the nutrient supply; and (3) measurement of rates of nutrient uptake. (Harris-Wisconsin)
W77-02451

SOME EFFECTS OF THE ASWAN HIGH DAM ON WATER AND FISHES OF LAKE BORULLUS, A. R. E.,
Academy of Scientific Research and Technology, Cairo (Egypt).
H. M. El-Sedfy, and J. Libosvarsky.
Zool Listy. 23(1), p 61-70, 1974.

Descriptors: *Lakes, Africa, *Nutrients, Fish, Fish reproduction, Fishing, Tilapia, Water pollution effects, *Water quality.
Identifiers: *Aswan Dam(Egypt), *Lake Borullus(Egypt).

The scanty data assembled on the inflow of fresh water into Lake Borullus throw some light on the developments occurring in the Nile delta lakes after the new High Dam at Asswan was erected. In contrast to the past when huge amounts of flood water poured into the lake during 2-5 months of the year, the lake now obtains drainage and, to some extent, also Nile water more or less regularly throughout the year. As a result the water level as well as the water chlorinity are more balanced, which, presumably together with the lower input of fish and nutrients of Nile origin, have a bearing on the fish fauna and fish production in the lake. The landing statistics for 9 yr (1962-1970) show, commencing form the peak year 1966, a gradual decrease in fish production and a shift in favor of Tilapia species. The overfishing the lake has been exposed to may play an important role in this respect.--Copyright 1975, Biological Abstracts, Inc.
W77-02512

WATER FOWL REFUGE EFFECT ON WATER QUALITY: I. BACTERIAL POPULATIONS,
New Mexico Inst. of Mining and Technology, Socorro. Dept. of Biology; and New Mexico Inst. of Mining and Technology, Socorro. Dept. of Chemistry.
A. A. Brierley, D. K. Brandvold, and C. J. Popp.
Journal Water Pollution Control Federation Vol. 47, No. 7, p 1892-1900, July 1975. 4 fig, 4 tab, 9 ref. OWRT A-038-NMEX(4).

Descriptors: *Waterfowl, Aquatic bacteria, Sediment load, Water quality, Water pollution sources, Bacteria, *Rio Grande River, Nutrients, Migrating birds, Aquatic life, Canada goose, Snow goose, Ducks(Wild), Sandhill cranes, Coliforms, New Mexico, Running water.
Identifiers: Bosque del Apache National Wildlife Refuge(N Mex), Enterococci, Heterotrophic bacteria.

The Bosque del Apache National Wildlife Refuge is located on the Rio Grande about 12 miles (19.32 km) south of Socorro, New Mexico. The largest bird populations occur from late October to early March; average figures are 10,500 sandhill cranes, 2,000 canada geese, 8,300 snow geese and 26,500 ducks. The channel water of the Rio Grande which flows through the refuge has a high concentration of suspended sediment, heterotrophic bacteria, and coliforms. The bacterial concentration seems to correlate directly with the high sediment concentrations. The presence of a large number of birds apparently did not affect the concentrations of total heterotrophic bacteria, coliform counted at incubation temperatures of 35 and 44.5C, and enterococci. The draining of the principal pond did not seem to affect significantly the bacterial population in the recieving channel water. The pond had a decrease in number of bacteria during and following its period of maximum use. There was little apparent change in the quality of the water used by the refuge as evaluated by quantitative determination of heterotrophic bacteria, coliforms, and enterococci. (Hain-New Mexico State)
W77-02513

SEASONAL VARIATIONS OF TEMPERATURE AND NUTRIENTS IN THE SURFACE WATERS OF LAKES ONTARIO AND ERIE,
Eidgenoessische Anstalt fuer Wasservorsorgung, Abwasserreinigung und Gewaesserschutz, Kastienbaum (Switerzerland). Hydrobiology Lab.
R. Gachter, R. A. Vollenweider, and W. A. Glooschenko.
J Fish Res Board Can. 31(3), p 275-290, 1974.

Descriptors: Seasonal, *Lake Ontario, *Lake Erie, *Water temperature, *Nutrients, Surface waters, Great Lakes, Canada, Primary productivity.

During 1970, temperature and nutrient distributions were measured in surface waters of lakes Ontario (12 cruises) and Erie (10 cruises) (USA, Canada). Nutrient patterns are compared and discussed in relation to temperature, primary production and nutrient sources. In Lake Erie, due to the early onset of the phytoplankton spring bloom, nutrient concentration started to decrease much earlier than in Lake Ontario. During spring, patterns of nutrients, chlorophyll a and primary production were influenced by the thermal bar in Lake Ontario. In Lake Erie the nutrient supply controlled such patterns. In Lake Erie inorganic nutrients were depleted lake-wide in summer; in Lake Ontario, nutrients were highest in regions where upwelling occurred or inputs were high. Due to the earlier onset of fall overturn in Lake Erie, the nutrient concentration started to increase earlier in the fall than in Lake Ontario.--Copyright 1974, Biological Abstracts, Inc.
W77-02515

THE EUTROPHICATION IMPLICATIONS OF INTERACTIONS BETWEEN NATURALLY OCCURRING PARTICULATES AND METHANE OXIDIZING BACTERIA,
Ohio State Univ., Columbus. Dept. of Microbiology.
T. L. Weaver, and P. R. Dugan.
Water Research, Vol. 6, p. 817-828, 1972. 10 fig, 1 tab, 8 ref. OWRT A-027-OHIO(4).

Descriptors: *Eutrophication, *Methane bacteria, Clay minerals, Oxidation, Aquatic microbiology, Algae, Chromatography, Pollutant identification, Cycling nutrients, Lake Erie, Ecosystems.
Identifiers: *Methane oxidation, *Methane fixation, Methane carbon recycling.

The oxidation of methane by bacteria is shown to be markedly affected by various particulate materials. Several clay minerals enhanced methane oxidation while some non-clay inorganic particulates nearly completely inhibited it. Insoluble organic compounds tested were degraded in the cultures and did not function as particles. Algal cells observed as living organic particulates inhibited methane oxidation with various degrees of intensity. Suggestions are given for several particulate management practices to partially control eutrophication. (Chao-Ohio St)
W77-02536

THE EFFECT OF SELENITE ON THE PHYSIOLOGICAL AND MORPHOLOGICAL PROPERTIES OF THE BLUE-GREEN ALGA PHORMIDIUM LURIDUM VAR. OLIVACEA,
Medical Coll. of Ohio at Toledo. Dept. of Microbiology.
M. Sielicki, and J. C. Burnham.
Journal of Phycology, Vol. 9, No. 4, p 509-514, 1973. 6 fig, 16 ref. OWRT A-025-OHIO(3).

Descriptors: *Cyanophyta, Algae, Algal control, Chlorphyll, Photosynthesis, Systematics, Proteins.
Identifiers: *Selenite, *Phormidium luridum, Sodium selenite.

Phormidium luridum cultures were treated with sodium selenite in concentrations ranging from 10-6M to 10-2M. In contrast to the increasing culture turbidity of control and 10-6M selenite cultures, the turbidity of the other selenite cultures declined in proportion to time and selenite concentration. Chlorophyll extraction revealed similar results. Photosynthetic activity was inhibited within 6 hr in all cultures except control and 10-6M selenite. Phormidium at concentrations greater than 10-6M selenite showed a gradual loss of the bright green color and turned semitransparent. Cell-associated granules of reduced selenium were observed at higher selenite concentrations. Other structural changes observed were the presence of intracellular and intercellular spaces, spheroplast formation, and gradual cell lysis. Protein analyses of total cell samples and supernatant fractions confirmed cellular breakdown of selenite-treated algal cells.
W77-02546

SURVEY OF MACROINVERTEBRATE COMMUNITIES IN THE PROVO RIVER AND DIAMOND FORK SYSTEMS,
Brigham Young Univ., Provo, Utah. Center for Health and Environmental Studies.
R. N. Winget, and M. K. Reichert.
Final report, 36 p., 4 fig, 11 tab.

Descriptors: *Benthos, Stream improvement, *Water quality, Habitats, Surveys, *Utah, *Invertebrates, Pre-impoundment.
Identifiers: Provo River(Utah), Diamond Fork River(Utah), Central Utah Project, Critical aquatic habitat.

Several proposed features of the Bonneville Unit of the Central Utah Project (cup) would have significant impacts on the aquatic resources of the Provo River and Diamond Fork Systems. In order to prepare an adequate environmental impact statement an understanding of existing conditions was needed. This study was to provide characteristics of the macroinvertebrate communities of the major segments of the streams in these two systems. These data are to provide a partial basis of habitat evaluations and future management alternatives in relation to water resource development under the CUP. Both systems had segments capable of supporting quality cold water fisheries; segments of marginal quality requiring improved management practices before a fisheries could be sustained; and segments which should be designated as primarily water transport systems and not listed as part of the fisheries habitat

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resource for this area. The macroinvertebrate communities reflected the environmental characteristics of each of these segment types.
W77-02548

ENVIRONMENTAL ASPECTS OF CHEMICAL USE IN PRINTING OPERATIONS, (SEPTEMBER 22-24, 1975, KING OF PRUSSIA, PA.), CONFERENCE PROCEEDINGS.
Environmental Protection Agency, Washington, D. C. Office of Toxic Substances.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-251 406, Price codes: A20 in paper copy, A01 in microfiche. Report EPA-560/1-75-005, January, 1976. 465 p.

Descriptors: *Chemical wastes, Conferences, *Public health, Recycling, Water pollution control, Water pollution sources, Environmental effects, Wastes, Industrial wastes, Chemical industry.
Identifiers: *Printing industry.

Papers presented at the conference are reproduced. They cover printing processes and current usage of chemicals in the printing industry; health or environmental impact of chemicals used; waste recovery and recycling;; and environmental impact of new printing processes and chemicals. (Witt-IPC)
W77-02553

TOXICITY, UPTAKE AND SURVEY STUDIES OF BORON IN THE MARINE ENVIRONMENT,
Fisheries and Marine Service, West Vancouver (British Columbia). Pacific Environment Inst.
J. A. J. Thompson, J. C. Davis, and R. E. Drew.
Water Research, Vol. 10, No. 10, p 869-875, 1976.

Descriptors: *Pulp wastes, *Water pollution effects, *Toxicity, *Boron, *Marine animals, Aquatic animals, Sodium compounds, Salmon, Lethal limit, Sockeye salmon, Oysters, Canada, Foreign countries, Wastes, Industrial wastes, Water pollution sources, Freshwater, Sea water, Bioassay, Effluents, Pacific Coast Region, Fish physiology, Fish behavior, Fish, Pulp and paper industry.
Identifiers: Sodium metaborate, Coho salmon(Onchorhynchus kisutch), Crassostrea gigas, Groundwood mills, Boron compounds, Borates.

Little is known about the toxic and bioaccumulative dangers to aquatic life posed by borate discharge recently initiated by coastal British Columbia groundwood pulp mills. Bioassays with sodium metaborate and underyearling coho salmon (Onchorhynchus kisutch) in fresh water yielded a 283-hr LC(50) of 113 micrograms/ml (95% confidence limits of 104 and 123 micrograms/ml boron). Toxicity to coho salmon in sea water appeared considerably greater with a 283-hr LC(50) of 12.2 micrograms/ml (95% confidence limits of 10.89 and 14.56 micrograms/ml boron). The disparity between fresh and saltwater boron toxicity to coho is not understood. In salmonids, boron enters the tissues slowly, necessitating prolonged bioassay tests. Sockeye salmon (O. nerka) and juvenile oysters (Crassostrea gigas) exposed to sublethal doses of boron take up boron roughly in relation to its availability. Oysters show no bioaccumulative potential or prolonged retention of boron following cessation of dosage. Field surveys conducted before and after industrial borate emission confirm the lack of evidence for tissue bioaccumulation. Results of a survey of boron levels in receiving waters are reported. No hazard to salmonids or oysters at the present level of industrial discharge of boron (less than 1 microgram boron/ml) is apparent from this work. (Witt-IPC)
W77-02565

PROGRESS IN SUBLETHAL EFFECT STUDIES WITH KRAFT PULP MILL EFFLUENT AND SALMONIDS,
Fisheries and Marine Service, West Vancouver (British Columbia). Pacific Environment Inst.
J. C. Davis.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 9, p 2031-2035, September, 1976. 33 ref, 2 tab.

Descriptors: *Pulp wastes, *Water pollution effects, *Salmonids, Bleaching wastes, Wastes, Industrial wastes, Water pollution sources, Water pollution, Fish, Growth rates, Fish behavior, Metabolism, Respiration, Circulation, Temperature, Resistance, Energy, *Lethal limit, Fish physiology, Toxicity, Effluents, Pulp and paper industry, Taste, Color, Organoleptic properties.
Identifiers: Kraft mills, *Sublethal effects.

Literature values of incipient sublethal response threshold concentrations for salmonids to effluent from neutralized whole bleached kraft mills, kraft bleaching, and the production of unbleached pulp are summarized. Sublethal responses included effects on growth, behavior, energetics, metabolism, respiration, circulation, and temperature tolerance in a variety of salmonids. The average incipient threshold concentration for all species surveyed was 0.16 of the 96-hr LC(50) and ranged from 0.006 to 0.33 96-hr LC(50) for neutralized whole bleached kraft mill effluent. Large differences in sensitivity were not evident between salmonid species or the three effluent types surveyed. On the basis of this analysis, it is suggested that some sublethal effects for neutralized whole bleached kraft mill effluent wil be present at a discharge dilution of 0.1 96-hr LC(50), few at 0.05 96-hr LC(50), and only rarely at 0.02 96-hr LC(50). However, at a dilution of 0.02 of the 96-hr LC(50), flesh tainting or color effects on the food chain may remain. These criteria are considered tentative and subject to revision with new knowledge and do not necessarily ensure protection of aquatic communities or sensitive food-chain organisms. Future research needs and suggestions for criteria implementation are discussed. (Witt-IPC)
W77-02573

5D. Waste Treatment Processes

A BIOASSAY TO ASSESS WASTEWATER TOXICITY TO AEROBIC BIOLOGICAL TREATMENT,
Oregon State Univ., Corvallis. Dept. of Civil Engineering.
K. J. Williamson.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 394, Price codes: A03 in paper copy, A01 in microfiche. Oregon Water Resources Research Institute, Corvallis, Completion Report WRRI-49, September 1976. 43 p, 8 fig, 2 tab, 33 ref. OWRT A-036-ORE(1).

Descriptors: *Toxicity, *Bioassay, *Biological treatment, *Waste water treatment, *Aerobic treatment, Zinc, Phenols, Freeze drying, Activated sludge, Nitrites, Bioindicators, Pollutant identification, Heavy metals.
Identifiers: Nitrobacter, Trichlorophenol.

The objective was to develop a bioassay for wastewater toxicity that could be used at sewage treatment plants. Nitrobacter was used as the test organism due to the simplicity of quantifying substrate removal rates by measuring nitrite removal, a sensitivity for most toxicants greater than that of heterotrophic organisms, and a slow growth rate which enables the use of batch-fed tests. A method was developed for preserving the Nitrobacter organisms by freeze-drying. Substrate removal rates were measured for both freeze-dried and non-freeze-dried Nitrobacter in the presence of a heavy metal and an orgaic toxicant. Zinc and 2,4,5-trichlorophenol exhibited toxic effects to the Nitrobacter at concentrations comparable to those toxic to activated sludge.
W77-02081

A STUDY OF THE PHYSICOCHEMICAL PARAMETERS AFFECTING THE REMOVAL OF COLLOIDAL PARTICLES FROM WATER BY POROUS MEDIA,
Maine Univ., Orono. Dept. of Civil Engineering.
M. M. Ghosh.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 392, Price codes: A03 in paper copy, A01 in microfiche. Maine Land and Water Resources Institute, Orono, Completion Report, April 1976. 34 p, 5 fig, 4 tab, 14 ref. OWRT A-023-ME(2).

Descriptors: *Filtration, Polymers, *Zeta potential, *Diffusion, Effluents, *Colloids, *Waste water treatment, *Porous media, Model studies, Dispersion, Sewage effluents, Interception, Sands.
Identifiers: *Colloid Filtration, Polymer-coated sands, Brownian diffusion, London forces.

A conceptual model has been developed for the depth filtration of water and wastewater using granular beds considering the effect of gravity, interception, hydrodynamic forces, London attraction and Brownian diffusion for systems with negligible double layer forces. The ultimate capture of particles in a packed bed is determined not only by the transport mechanisms but also by the short-range surface forces which may play a dominant role in their attachment to media grains. The experimental data obtained for the filtration of latex monodispersions and secondary effluents using a polymercoated sand bed were in good agreement with the predictive model during initial periods of filtration when the volume of deposited material was insignificant.
W77-02086

SEPTIC TANK EFFLUENT MOVEMENT THROUGH SOIL,
Maine Univ. at Orono. Dept. of Soil Chemistry.
For primary bibliographic entry see Field 5B.
W77-02087

UTILIZATION OF NUTRIENTS FROM WASTEWATER BY WHEAT,
Arizona Univ., Tucson. Dept. of Soils, Water and Engineering.
D J Larsen
Master of Science thesis, 1976. 62 p, 3 fig, 23 tab, 32 ref.

Descriptors: *Municipal wastes, *Water reuse, *Impaired water use, *Wheat, *Irrigation practices, *Water supply, Water resources development, Water allocation(Policy), Water conservation, Crop production, Plant growth, Fertilizers, Soil-Water-Plant Relationships, Nutrients, Irrigation, Loam, Sands, Denitrification, Waste treatment, Soil types, Ureas.

During 1973 through 1974, the city of Tucson, Arizona, reported discharges of wastewater daily These wastewaters contain large quantities of essential plant nutrients, particularly nitrogen, phosphorus, and potassium. Research was conducted to evaluate wastewater as a source of plant nutrients and its effect upon the plants. A second objective was to evaluate the effect of wastewater application on soil chemical characteristics. Wheat plants were grown on three textures of native Gila series soils using several wastewater, wastewater-well water, and fertilizer treatments. Various physical and chemical plant parameters were measured The results were inconclusive in providing a true measure of increased yield or chemical composition of wheat straw due to wastewater applications Chemical analysis of the soils, after two consecutive crops of wheat grown to maturity in

each treatment, revealed several good indicators of wastewateroinduced chemical changes. Electrical conductivity and sodium phosphorus content of the soils were shown to be good measures of soil chemical changes resulting from wastewater applications. (Jamail-Arizona)
W77-02112

AQUEOUS HALOGEN EQUILIBRIA, CASE I. HALOGEN IN PURE WATER,
Army Medical Bioengineering Research and Development Lab., Fort Detrick, Md.
D. H. Rosenblatt, E. P. Meier, and M. J. Small.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-020 667, Price codes: A03 in paper copy, A01 in microfiche. Technical Report 7506, 49 p, November 1975. 4 tab, 13 ref, 2 append.

Descriptors: *Chlorine, *Halogens, *Bromine, *Iodine, *Hydrolysis, Chlorination, Chemical reactions, Water purification, Water treatment, *Disinfection, Water quality, Chemistry, Chemical degradation, Mathematical studies, Equilibrium, Aqueous solutions, Equations, *Waste water treatment, Computer programs, Pollutant identification.
Identifiers: *Chlorine hydrolysis, *Bromine hydrolysis, *Iodine hydrolysis, *Halogen species, Aqueous halogen equilibria, Equilibrium constants, Chlorine solutions, Disinfectants.

A 'master equation' was derived for the exact determination of the concentrations of halogen species formed when elemental chlorine, bromine, or iodine have been added to a water containing no interacting substances. The solutions to this equation apply only to equilibrium conditions and are only as exact as the equilibrium constants used in the calculations. Simplified lower order equations were also derived for such determinations where known boundary conditions exist. Logic diagrams were presented for the solution of the 'master equation' with the aid of a computer or a programmable calculator. A program was presented for solving the 'master equation' on the Hewlett-Packard 9830A Calculator. (Henley-ISWS)
W77-02150

WATER SUPPLY AND SEWAGE TREATMENT IN ARID AREAS.
Water Services, Vol. 80, No. 960, p 79-80, February, 1976.

Descriptors: *Water supply, *Sewage treatment, *Arid lands, *Sewage disposal, Potable water, Environmental effects, Sewage, *Treatment facilities, Waste water(Pollution), Water pollution, Water pollution sources, Water quality, Deserts, Desalination, Water treatment, Sludge disposal, Water reuse, Impaired water use, Waste water disposal, Solar.
Identifiers: Distillation.

Water supply and sewage treatment facilities in arid areas such as the Middle East, where potable water is scarce, present a variety of problems. Water demand, water supply and water quality in the Middle East are discussed and evaluated, and sewage treatment and its water requirements are investigated. Various methods of water resource development are presented including the drilling of deep bore holes to provide access to underground waters and the collecting of water in shallow concrete pans. Saline wells and seawater represent other possible water sources, and methods for their treatment such as desalination and solar distillation are evaluated. Sewage disposal and water reuse for agriculture are also discussed. It is concluded that there is need for education concerning public health, especially in areas where good water systems are a recent innovation. (Jamail-Arizona)
W77-02173

THE DESIGN AND TEST OF A SAFE AND EFFECTIVE STORM-SEWER INLET,
Kansas Water Resources Research Inst., Manhattan.
For primary bibliographic entry see Field 8B.
W77-02186

DEVELOPMENT OF DESIGN AND OPERATING CRITERIA FOR HANDLING ADVANCED WASTE TREATMENT PLANT SLUDGE,
Missouri Univ., Rolla. Dept. of Civil Engineering.
J. C. Huang, and K. C. Tsai.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 347, Price codes: A03 in paper copy, A01 in microfiche. Completion Report, August 1976. 30 p, 14 fig, 5 tab, 2 ref. OWRT A-074-MO(1). 14-31-0001-5025 and 6026.

Descriptors: Biological treatment, Dewatering, Sludge digestion, *Aerobic digestion, *Design criteria, *Sewage sludge, *Sludge treatment, Lime, *Waste water treatment, Water pollution control, Operations, Performance.
Identifiers: *Sewage lime sludge.

The purpose was to develop a set of criteria applicable for the design and operation of an aerobic digester treating sewage lime sludge generated from advanced waste treatment plants. Major parameters included: (1) detention time; (2) degree of sludge stabilization in terms of volatile solid destruction and COD reduction; (3) sludge dewaterability; (4) fate of precipitated phosphorus; (5) destruction of coliforms; and (6) effect of temperature on the sludge stabilization. Data of this study have indicated that sewage lime sludge is treatable by biological means. A maximum extent of stabilization is achieved within 5 days of digestion, as opposed to 15 days normally used for regular aerobic digesters. Improvement of sludge dewaterability has been significant, with similar efficiencies for a detention time ranging from 1.5 to 10 days; beyond that, a slight decrease of dewaterability has occured. Destruction of coliforms is not good even with a detention time as long as 20 days. Maintenance of a proper DO level in the digester is essential to prevent the release of phosphorus from the sludge phase into the aqueous solution. The treatment efficiencies at 20 and 30C are not much different while that at 10C is considerably lower. Based on the above findings, a new set of design criteria has been proposed for handling the sewage lime sludge.
W77-02188

REMOVAL OF VIRUSES FROM WATER BY MAGNETIC FILTRATION,
Florida Univ., Gainesville. Dept. of Environmental Engineering Sciences.
G. Bitton, G. E. Gifford, and O. C. Pancorbo.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-261 494, Price codes; A05 in paper copy, A01 in microfiche. Florida Water Resources Research Center, Gainesville, Publication No. 40, October 1976. 75 p, 9 fig, 21 tab, 84 ref, append. OWRT A-030-FLA(3), 14-31-0001-5009, 14-34-0001-6010.

Descriptors: *Filtration, *Waste water treatment, *Viruses, *Bacteriophage, Separation techniques, *Adsorption, Water treatment.
Identifiers: *Virus removal, *Magnetic filtration, *Poliovirus.

The process of magnetic filtration was applied to the removal of T2 bacteriophage, MS2 bacteriophage, and poliovirus type 1 (Sabin) from water and wastewater. Since the effectiveness of this process is governed by the adsorption of the viruses onto the magnetic iron oxide seed, magnetite, those factors influencing adsorption were investigated. The adsorption of the three viruses studied to magnetite at a concentration of 500 ppm increased in the presence of cations, was not affected when the pH was varied from 5 to 9, and could be described by the Freundlich adsorption isotherm. Viruses were suspended in two wastewater effluents and subsequently removed by magnetic filtration. Organic color interfered with the adsorption process. The interference was reduced by the addition of CaCl2, by the dilution of the wastewater with distilled water or by removing the organic color with activated carbon. Competition for adsorption was also exerted by 100 ppm of egg albumin, casein and dextran resulting in a significant reduction in the removal of poliovirus. Additionally, the infectivity of the magnetite-bound viruses was studied. Poliovirus, adsorbed to magnetite, was 100% infective whereas T2 phage displayed a lower and somewhat variable infectivity.
W77-02214

EAGLE LAKE POLLUTION CONTROL PROJECT, EAGLE LAKE KANDIYOHI COUNTY, MINNESOTA, BENCH MARK STUDIES,
Minnesota Univ., Minneapolis. Water Resources Research Center.
For primary bibliographic entry see Field 5G.
W77-02215

SANITARY-HYGIENIC EVALUATION OF THE RECYCLED WATER SUPPLY ON RAILROADS, (IN RUSSIAN),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Zheleznodorozhnoi Gigieny, Moscow (USSR).
For primary bibliographic entry see Field 3E.
W77-02241

THE INFLUENCE OF WASTE WATERS ON ALGAE IN THE OPEN COLLECTOR OF ZAGREB AT IVANJA RIJEKA, (IN CROATIAN),
Zagreb Univ. (Yugoslavia). Institut za Biologijo.
For primary bibliographic entry see Field 5C.
W77-02268

WAYS OF PREVENTING THERMAL POLLUTION OF WATER BODIES BY WASTEWATERS OF NUCLEAR POWER PLANTS, (IN RUSSIAN),
For primary bibliographic entry see Field 5G.
W77-02271

PRELIMINARY SELECTION OF STORM-WATER BASINS SUITABLE FOR INFILTRATION OF RECLAIMED WATER IN NASSAU COUNTY, LONG ISLAND, NEW YORK,
Geological Survey, Albany, N.Y. Water Resources Div.
For primary bibliographic entry see Field 5G.
W77-02322

TANKS OF PANEL CONSTRUCTION.
For primary bibliographic entry see Field 8A.
W77-02325

CONSTRUCTION OF GOSCOTE SEWAGE PUMPING STATION,
For primary bibliographic entry see Field 8C.
W77-02326

AUSTIN'S 11 MILE SEWER TUNNEL REFLECTS SOUND ECONOMIC, ENVIRONMENTAL ALTERNATIVES,
Austin City Dept. of Construction Management, Tex.
A. M. Eldridge.
Civil Engineering-ASCE, Vol. 46, No. 8, p 52-55, August, 1976. 1 fig.

Descriptors: *Sewers, *Tunnels, *Interceptor sewers, *Municipal wastes, *Construction, Tunnel design, Tunnel construction, Hydraulics, Sewage treatment, Hydrogen sulfide, Odor, Corrosion, Design criteria, Tunnel linings, Materials, Flow, Liquid wastes, Cities, Texas.

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An 11-mile, $20 million continuous sewer tunnel which extends across the city of Austin, Texas is described. The sewer tunnel is designed to serve as a sanitary sewer and obviates about 98,000 ft of relief sewer construction work. Anticipating a maximum flow rate of 131 million gallons/day for the year 2020 and an allowable slope of about 0.00066, the lower end of the tunnel is sized for a finished diameter of 96 in. Maximum velocity is expected to be about 4.6 ft/sec at the maximum future flow rate. The tunnel is fitted in places with removable cunnette inserts which provide the hydraulic characteristics of a 24-inch pipe for low flow conditions. Measures being taken to prevent hydrogen sulfide buildup in the tunnel along with the usually associated problems of odors and corrosion include: the provision of air-excluder gates at each inlet shaft and the use of specially designed inlet vortex chambers, T-lock polyvinyl chloride lining, and limestone coarse aggregate for the 12-inch concrete lining of the tunnel. In addition to relieving many existing sewers from periodic overflows, the all-gravity flow design of the crosstown interceptor reflects substantial long-range savings over the more conventional cut and cover alternative. (Kreager-FIRL)
W77-02327

THURROCK BEATS PEAT WITH PILED PIPES,
For primary bibliographic entry see Field 8E.
W77-02328

TEST NEW SEWERS WITH LOW-PRESSURE AIR,
For primary bibliographic entry see Field 8G.
W77-02329

PRECAST SEGMENTS SPEED INSTALLATION OF THUNDER BAY SEWER,
For primary bibliographic entry see Field 8F.
W77-02330

THE DESIGN AND CONSTRUCTION OF A SCREENING AND PUMPING STATION AND AN OUTFALL FOR THE DISPOSAL OF SEWAGE FROM BRIGHTON AND HOVE,
For primary bibliographic entry see Field 5E.
W77-02331

PLASTIC LINING OVERCOMES RUGGED TERRAIN,
Bement, Dainwood and Sturgeon, San Diego, Calif.
For primary bibliographic entry see Field 8G.
W77-02333

FLOW DATA COLLECTION FOR INFILTRATION-INFLOW ANALYSIS,
Whitman, Requardt and Associates, Baltimore, Md.
J. S. Maynes.
Journal Water Pollution Control Federation, Vol 48, No 8, p 2055-2061, August, 1976. 2 fig, 4 ref.

Descriptors: *Cost-benefit analysis, *Inflow, *Infiltration, *Treatment facilities, *Leakage, Surface waters, Groundwater, Flow, Cities, Urban runoff, Runoff, Pumping plants, Maryland.
Identifiers: Baltimore.

An analysis of the cost-effectiveness of continuing to transport and treat inflow (leakage from surface run-off resulting from rainfall) and infiltration (leakage originating from the groundwater table) versus eliminating these flows through a rehabilitation program was performed for the Baltimore, Maryland area over a 20-year planning period. The amount of infiltration was determined by comparing the observed average daily flows with computed flows, and inflow was determined by comparing the observed peak flow rate resulting from rainfall with the flow rate from a twin-day comparison. The annual flow records for two treatment plants in the area revealed that infiltration composed about 30% of the average daily flow, while infiltration flows for pumping stations ranged between 1-62%. In general, it appeared to be more economical to continue to transport and treat these infiltration flows rather than to identify and correct the sources. An exception to this involved several pumping stations which required three or more repumping operations downstream before the flow arrived at the treatment plant. Inflow quantity, on the other hand, was found to equal one-half of a station's pumping capacity. It generally appeared to be more cost-effective to correct sources contributing to extraneous flows in valleys that were currently fully developed and did not have relief interceptors planned. (Kreager-FIRL)
W77-02334

SUSPENDED SLUDGE SCRAPER FOR ARCUATE SEDIMENTATION ZONE,
Union Carbide Corp., New York (Assignee)
J. F. Pelton
United States Patent 3,977,974. Issued August 31, 1976. Official Gazette of the United States Patent and Trademark Office, Vol 949, No 5, p 2027-2028, August, 1976. 1 fig.

Descriptors: *Patents, *Waste water treatment, *Separation techniques, *Sludge, *Sedimentation, Equipment, Waste treatment, Solid wastes, Liquid wastes, Design criteria.

A patent for a waste water treatment device that allows for separation of solids from the liquid in a sedimentation zone is described. The device consists of two circular concentric walls spaced apart to form an intermediate volume. A first radial partition extends across the intermediate volume and is joined at opposite edges to the inner and outer walls, while a second radial partition is similarly located and spaced from the first partition to form an arcuate sedimentation zone. Means for introducing a liquid-solid feed in the arcuate sedimentation zone are provided to achieve a solids-depleted liquid in the upper part of the zone and a layer of settled solids in the bottom part of the zone. Means are also provided for discharging the solids-depleted liquid from the upper zone and for collecting the settled solids from the bottom part of the zone. The solids collection means include a mechanically driven bridge which moves in an arcuate path around the arcuate sedimentation zone and a scraper blade extending transversely across the sedimentation zone at the bottom thereof. (Kreager-FIRL)
W77-02335

CLARIFICATION PLANT,
J. R. Kaelin.
United States Patent 3,979,294. Issued September 7, 1976. Official Gazette of the United States Patent and Trademark Office, Vol. 950, No. 1, p 265, September, 1976. 1 fig.

Descriptors: *Patents, *Activated sludge, *Biological treatment, *Sewage treatment, *Recycling, Oxygenation, Design criteria, Equipment, *Waste water treatment.

A patent for an activated sludge clarification plant is described which provides for recycling of the activated sludge. The plant consists of at least one gas-tight activation tank provided with a surface ventilation rotor, a reclarification tank, inlet means for supplying sewage to the activation tank, and outlet means for conducting activation sewage to the reclarification tank. A conduit with one of its ends vertically oriented in the activation tank directly below the surface ventilation rotor is connected at its other end to the reclarification tank for recycling activated sludge concentrate from the reclarification tank to the activation tank. An outlet aperture in one end of the conduit is located in the suction zone of the surface ventilation rotor such that the activated sludge in the conduit is sucked upward through the surface ventilation rotor zone. Means are also provided for supplying pure oxygen to the other end of the conduit for application to the concentrated recycled activated sludge prior to the sludge's entry into the surface ventilation rotor. (Kreager-FIRL)
W77-02337

FREEING WASTE WATER FROM NITROGENOUS CPDS - USING PARTIALLY OXIDISED SLUDGE AS SOURCE OF ORGANIC CARBON.
South African Patent ZA 7505-682. Issued September 5, 1975. Derwent French Patents Abstracts, Vol. X, No. 37, p D2-D3, August, 1976.

Descriptors: *Patents, *Waste water treatment, *Nitrogen compounds, *Nitrification, *Denitrification, Biological treatment, Oxidation, Chemical reactions, Liquid wastes, Chemical wastes, Nitrates, Nitrogen, Ammonia, Biomass, Microorganisms.

A patent for a process that removes nitrogen compounds from waste water is described. The process involves mixing the waste water with active nitrifying organisms and an oxygen-containing gas to convert the nitrogenous material to the nitrate form. The nitrifying organisms and accumulated biomass are then separated from the waste water and recycled to the nitrification contacting step. A portion of the accumulated biomass is either periodically or continuously removed from the nitrifying step. The nitrified waste water is then contacted with heterotrophic denitrifying bacteria in the presence of a source of organic carbon to reduce nitrate nitrogen to elemental nitrogen. The denitrifying organisms and accumulated biomass are separated from the waste water and recycled to the denitrification step, with a portion of the accumulated biomass being either periodically or continuously removed from the denitrifying step. The process is improved by heating the biomass removed from the nitrifying and denitrifying steps in the presence of an oxygen-containing gas at 175-315C at an oxygen partial pressure of 5-250 pounds/sq in to partially oxidize the biomass and convert the organic nitrogen to ammonia nitrogen. The solid phase is then separated from the liquid phase of the oxidized mixture; and after ammonia is removed from the liquid phase, the latter is directed to the denitrifying step as a source of carbon. (Kreager-FIRL)
W77-02339

FLUID SAMPLER AND OXYGEN METER FOR SEWAGE PROCESSING - BIOLOGICAL OXYGEN DEMAND DETAILED CONTINUOUSLY BY REACTION VESSEL READ-OUT.
For primary bibliographic entry see Field 5A.
W77-02340

COMBINED FILTER AND DRYER FOR SEWAGE SLUDGE ETC. - USES BAND OF VACUUM FILTER TO CARRY CAKE THROUGH FILTER PRESS.
French Patent FR 2289-453. Issued October 30, 1975. Derwent French Patents Abstracts, Vol. X, No. 36, p D4, May 28, 1976.

Descriptors: *Patents, *Sewage sludge, *Drying, *Sludge treatment, *Filters, Equipment, Waste treatment, Dewatering, Solid wastes, Filtration.

A patent for a sewage sludge filter and dryer combination is described. The device combines a vacuum band filter with a filtrate expressing unit. A porous band which carries the filter cake from its passage around a partly-immersed vacuum filter drum moves horizontally into the expressing unit where it is squeezed between a porous drainage plate below the band and a fluid-pressurized, impervious membrane above the cake. The machine is programmed so that the drum

otates periodically to advance the band only when he expressing unit is inactive. The device is useful or drying sludges prior to incineration and is easi- y installed. (Kreager-FIRL)
V77-02341

EWAGE SURFACE AERATOR - WITHOUT XIAL THRUST THUS REDUCING VIBRA- ION FROM WAVES.
German Patent DS 2120-576. Issued September 9, 976. Derwent German Patents Abstracts, Vol. X, No. 38, p D1, October 27, 1976.

Descriptors: *Patents, *Rotors, *Aeration, Sewage treatment, Flow, *Waste water treat- ment, Equipment, Design criteria, Liquid wastes.

A patent for a sewage surface aerator rotor that educes vibration from waves by avoiding axial hrust is descried. The aerator rotor consists of a riven vertical shaft to which several vanes are at- ached by means of a circular support. The vanes e in vertical planes containing the rotor axis or lanes parallel to it which extend beyond the edge f the circular support when seen axially from bove. The vanes are at least partially immersed in he water. The effective surfaces of the rotor are rranged so that they do not produce any axial orce components, either individually or together. The vanes extend from the support first ownwards and outwards and then parallel to the haft in the region of immersion. The rotor is im- ersed in the water only to the point where in peration the support is either not subject to flow r only to flow in a direction free from axial thrust. (Kreager-FIRL)
V77-02342

OLESHILL ADVANCED WASTEWATER REATMENT PROJECT,
. F. G. Clough, and A. D. Maskell.
roceedings of the Institution of Civil Engineers, ol. 60, Part 1, p 383-400, August, 1976. 7 fig, 2 ab, 6 ref.

escriptors: *Treatment facilities, *Tertiary treat- ent, *Waste water treatment, *Biological treat- ent, *Physical control, Activated sludge, Sludge eatment, Dewatering, Filtration, Settling basins, eparation techniques, Sewage treatment, conomics, Flocculation, Activated carbon, ime, Evaluation, Performance.
lentifiers: Recarbonation.

full-scale advanced waste water treatment in- allation at Coleshill, Great Britain is described. he facility utilizes mobile process units which low for the linking up of various experimental eatment sequences. The basic treatment steps nployed at the facility include: lime addition and occulation, primary settling, recarbonation and condary settling, sludge consolidation, multi- edia filtration, activated carbon treatment, ac- vated sludge treatment, and final settling. A idge dewatering facility is also provided. Ini- ally, physical-chemical processes for sewage eatment are being examined. An important ob- ctive of the experimental waste water treatment ogram is to obtain information on which an onomic assessment of advanced waste water eatment can be based. (Kreager-FIRL)
77-02344

DVANCED WASTE TREATMENT PLANT AS PHYSICAL-CHEMICAL OPTION,
ichart-Horn, Lewisburg, Pa.
L. McDowell, and M. Goldman.
blic Works, Vol. 107, No. 9, 2 p, September, 76.

scriptors: *Waste water treatment, *Tertiary atment, *Treatment facilities, *Municipal stes, *Biological treatment, Design criteria, occulation, Chlorination, Aeration, Oxidation, uipment, Filtration, Chemical oxygen demand, spended solids, Liquid wastes.

The design of an advanced municipal waste water treatment plant with physical-chemical options is described. Waste water passes through a grit chamber and comminutor to a pumping station, and the pumped wastes are discharged directly to twin oxidation ditches which are circular and have a common wall. The oxidation ditches are designed to provide a 24-hour retention period at a design flow rate of 130,000 gallons/day. The remaining plant features to achieve advanced waste water treatment consist of triple-media filters (equipped for backwash and surface wash) operating in conjunction with flocculation equipment and tube settlers plus a chlorine contact tank. An aerated equalization tank of reinforced concrete intervenes between the clarifier and filter complex to maintain a constant feed to the filters. The flocculator and tube settler are incorporated into the design for phosphorus removal if desired or for physical chemical treatment of raw waste water. A chemical feed system is also built into the plant for phosphorus removal. A chlorine contact tank capable of dosing up to 27 pounds of chlorine/day at the design flow also serves as a reservoir for filter backwash water. The filtered effluent is expected to have a chemical oxygen demand of 25 milligrams/liter and a suspended solids level of 4 milligrams/liter. (Kreager-FIRL)
W77-02345

PHOSPHORUS REMOVAL WITH ALUM FROM SECONDARY EFFLUENT,
North Carolina Univ. at Chapel Hill. Dept. of Environmental Sciences and Engineering.
D. E. Francisco, M. Strauss, and B. A. Dempsey.
Journal Water Pollution Control Federation, Vol. 48, No. 8, p 2002-2006, August, 1976. 1 fig, 5 tab, 12 ref.

Descriptors: *Waste water treatment, *Phosphorus, *Phosphates, *Chemical wastes, *Chemical properties, Biological treatment, Performance, Efficiencies, Evaluation, Calcium, Hardness(Water).
Identifiers: Alum, Sodium tripolyphosphate.

The effect of sodium tripolyphosphate on alum removal of phosphorus from synthetic raw waste water samples was investigated. Waste waters containing different forms of phosphorus (orthophosphate, sodium tripolyphosphate, and combinations of the two) were biologically treated in a 5-hour detention activated sludge unit prior to the treatment of the effluents with alum in a jar test apparatus. While phosphorus removal increased with alum dosage to an alum:phosphorus ratio of 1.8 in all samples, there were no significant differences between the samples in terms of alum requirements for phosphorus removal. Thus, previous findings suggesting that sodium tripolyphosphate raises the alum requirement for phosphorus removal in waste water were not duplicated in this study. Apparently some other constituent in the waste water, either alone or in combination with sodium tripolyphosphate, was responsible for previously observed alum requirement increases. The effect of calcium hardness on phosphorus removal by alum was also investigated, and a hardness of 150 milligrams/liter was found to decrease the amount of alum required for an equivalent alum dosage. (Kreager-FIRL)
W77-02346

DENITRIFICATION OF NITRIFIED SEPTIC TANK EFFLUENT,
Wisconsin Univ., Madison. Dept. of Soil Science.
L. J. Sikora, and D. R. Keeney.
Journal Water Pollution Control Federation, Vol. 48, No. 8, p 2018-2025, August, 1976. 7 fig, 2 tab, 26 ref.

Descriptors: *Denitrification, *Septic tanks, *Feasibility studies, *Waste water treatment, *Nitrates, Kinetics, Chemical reactions, Monitoring, Oxidation, Reduction(Chemical), Performance, Measurement, Limestones, Alcohols.
Identifiers: Methanol.

Denitrification of nitrified septic tank effluent was achieved in continuous flow columns packed with limestone chips using methanol as an energy source. Nearly complete nitrate removal was attained in 17 hr at 5 C, 13 hr at 13 D, and in less than 2 hr at 20 C. The general kinetics of the systems were best depicted as first order. An Arrhenius relationship was also demonstrated, with the calculated activation energy being 12.25 kilocalories/mole of nitrate nitrogen. Nitrogen was the gas detected in highest concentrations, but oxygen, methane, and occasionally carbon dioxide were also present in the system. Oxidation-reduction potentials in the columns were generally in the 100-200 millivolt range. The performance of in situ oxidation-reduction electrodes during the denitrification experiment demonstrated their potential use for monitoring the efficiency of operating field systems. Carbon analyses performed during denitrification at 5 C revealed a ratio of 0.89 milligrams of methanol carbon oxidized to 1 milligram of nitrate nitrogen reduced.
W77-02347

WASTE WATER PROCESSING WITH HGMS (HIGH GRADIENT MAGNETIC SEPARATORS),
Bechtel International Corp., San Francisco, Calif.
R. R. Oder, and B. I. Horst.
Filtration and Separation, Vol. 13, No. 4, p 363-364, 366, 368-369, 377, July/August, 1976. 5 fig, 10 tab, 15 ref.

Descriptors: *Waste water treatment, *Suspended solids, *Tertiary treatment, *Magnetic studies, *Separation techniques, Liquid wastes, Economics, Feasibility, Efficiencies, Municipal wastes.
Identifiers: *High gradient magnetic separators.

A conceptual process for high gradient magnetic separation treatment of municipal secondary effluent based on recent bench-top laboratory results was used as a model for comparison with more conventional solids separation techniques. The conceptual process is designed for 80-90% solids reduction when processing typical municipal secondary effluents containing a nominal 50 ppm suspended solids. Estimated high gradient magnetic separator treatment costs for waste water treatment plants with 1, 10, and 100 million gallon/day capacities were 68, 22, and 15 cents, respectively. For process capacities of 10 million gallons/day, these costs compare favorably with those of conventional two-stage tertiary lime treatment. In addition, high gradient magnetic separators also offer economy of space. (Kreager-FIRL)
W77-02348

NITRIFICATION IN HIGH-SLUDGE AGE CONTACT STABILIZATION,
Florida Univ., Gainesville. Dept. of Environmental Engineering Sciences.
J. Zoltek, Jr., and L. Lefebvre.
Journal Water Pollution Control Federation, Vol. 48, No. 9, p 2183-2189, September, 1976. 4 fig, 1 tab, 11 ref.

Descriptors: *Nitrification, *Waste water treatment, *Activated sludge, *Kinetics, *Ammonium compounds, *Nitrogen compounds, Organic compounds, Nitrates, Chemical reactions, Biological treatment, Oxidation, Feasibility studies, Aeration.
Identifiers: *Contact stabilization.

Nitrification of raw waste water in a high-sludge age, contact-stabilization activated sludge plant was investigated. The unit substrate (ammonium ion nitrogen) removal rate was directly proportional to the overall substrate removal rate and inversely proportional to the mass of the activated sludge. Initial hydrolysis of organic nitrogen to ammonia proceeded quite rapidly during the early stages of aeration for raw waste water, but then

U. OF I. URBANA-CHAMPAIGN

began to level off at a very slow rate. Unless the return sludge ratio is very high, contact stabilization modification of activated sludge systems does not appear to be feasible for producing a substantial degree of oxidation of ammonia nitrogen and organic nitrogen to nitrate nitrogen when raw waste is treated. (Kreager-FIRL)
W77-02349

EMERGENCY REPAIR OF A DEEP STORM SEWER LINE,
For primary bibliographic entry see Field 8G.
W77-02350

MINNEAPOLIS-ST. PAUL: LAND OF THE 'SHINING BIG-SEA-WATERS',
Metropolitan Waste Control Commission, St. Paul, Minn.
T. J. Vandervoort, and K. A. Denisen.
Journal Water Pollution Control Federation, Vol. 48, No. 9, p 2107-2113, September, 1976.

Descriptors: *Waste water treatment, *Water quality, *Water pollution control, *Treatment facilities, *Minnesota, Surface waters, Rivers, Lakes, Biological oxygen demand, Dissolved oxygen, Suspended solids, Construction, Sewers, Programs, Monitoring, Municipal wastes.
Identifiers: *Minneapolis-Saint Paul(Minn).

Efforts by the Minneapolis-Saint Paul Metropolitan Waste Control Commission to upgrade waste water treatment facilities in the area and to improve the water quality of lakes and rivers in the region are reviewed. Only three of 33 waste water treatment plants in 1971 met all state and federal effluent standards consistently, and the overall average removal efficiencies of biochemical oxygen demand and total suspended solids were 68% and 78%, respectively. Since that time, seven outmoded waste water treatment plants have been phased out, and existing plants have been upgraded so that by the end of 1974, 13 out of 21 treatment plants consistently met the secondary treatment definition set forth by the Environmental Protection Agency. In 1973 two new treatment plants were placed in operation, one being the first full-scale physical-chemical treatment facility in the nation. Nearly 100 miles of new sewer interceptors were also constructed. During 1975 the Commission routinely sampled 26 locations on six rivers and one creek for over 50 water quality parameters. Dissolved oxygen concentrations in the Mississippi, Minnesota, and Saint Croix Rivers during 1975 were never below the 5 milligram/liter standard in contrast to dissolved oxygen concentrations of below 1 milligram/liter which were observed in 1970. (Kreager-FIRL)
W77-02351

HEAVY METALS-INDUCED DEFLOCCULATION OF ACTIVATED SLUDGE,
Pittsburgh Univ., Pa. Water and Environmental Engineering Program.
R. D. Neufeld.
Journal Water Pollution Control Federation, Vol. 48, No. 8, p 1940-1947, August, 1976. 11 fig, 9 ref.

Descriptors: *Activated sludge, *Waste water treatment, *Heavy metals, *Flocculation, *Biological treatment, Biomass, Performance, Sludge, Microorganisms.
Identifiers: *Deflocculation.

The influence of shock loadings of heavy metals (mercury, cadmium, and zinc) on activated sludge deflocculation was investigated in cultures maintained in a captive condition with no deliberate sludge wasting. No operational difficulties in terms of the underflow control of gravity cell separators are anticipated based on the above experiments, but potential problems involving the possibility of substantial loss of biomass in the form of pinpoint discrete solids over the effluent weir of gravity separators can be expected as a result of heavy metal shock loadings. Such problems may be overcome by using polyelectrolytes or other types of liquid solid separators (sand filters for effluent polishing or continuous centrifuges for cell separation) in conjunction with cell recycling. Maximum deflocculation in the experimental continuous culture system used occurred after 3-4 days for mercury addition, 12-14 days for cadmium addition, and 10-12 days for zinc addition. While deflocculation did not result at cadmium and zinc levels lower than 20 or 40 milligrams/liter, respectively, virtually any mercury level resulted in some degree of deflocculation. (Kreager-FIRL)
W77-02352

SALT WATER DOMESTIC WASTE TREATMENT,
Rice Univ., Houston, Tex. Dept. of Environmental Science and Engineering.
M. A. Kessick, and K. L. Manchen.
Journal Water Pollution Control Federation, Vol. 48, No. 9, p 2131-2136, September, 1976. 6 fig, 17 ref.

Descriptors: *Domestic wastes, *Saline water, *Waste water treatment, *Water conservation, *Coagulation, Flocculation, Organic compounds, Suspended solids, Turbidity, Biodegradation, Bacteria, Salinity, Physical properties, Chemical properties, Waste disposal, Lime.
Identifiers: Alum.

The feasibility of using salt water as a flush medium for domestic wastes was investigated, with particular emphasis on the effect of salt water wastes on coagulation and flocculation processes which are normally used in the first step of any physical-chemical treatment process. Laboratory experiments with samples of primary domestic waste water containing sea salts indicated that increasing the salt content of such waste water causes no net precipitation or salting out of organic material. Alum and lime proved to be effective coagulants for simulated salt water domestic waste. Alum coagulation was equally effective for turbidity and organic content removal in both fresh and salt water waste samples; while the addition of lime was associated with an increase in the nonsettleable organic fraction, although the turbidity was still reduced. Biodegradation of the soluble fraction of domestic waste with resident bacteria was unaffected by sea salt to levels expected in a seawater waste system. However, sea salt addition markedly inhibited the biodegradation of the suspended fraction. Thus, if the suspended fraction of salt water domestic wastes is dumped in the ocean, it may not exert an oxygen demand equivalent to that exerted in freshwater environments when metabolized by members of the waste's own resident microbial population. (Kreager-FIRL)
W77-02353

SOLAR SEWAGE PLANT 75% ENERGY SELF-SUFFICIENT.
Engineering News-Record, Vol. 197, No. 12, p 20, September, 1976. 1 fig.

Descriptors: *Waste water treatment, *Municipal wastes, *Treatment facilities, *Solar radiation, *Recycling, Biological treatment, Heat transfer, Symbiosis, Economics, Energy transfer, Methane, Construction, Design criteria, Liquid wastes, Maine.

The design of a 450,000-gallons/day primary and secondary waste water treatment plant that will treat waste water from 4200 residents of rural Wilton, Maine, using solar energy as an integral part of the biological treatment process is described. The sun's radiance will heat the process via solar collectors from the time waste water enters the plant through economical screw pumps until the treated effluent is passed through energy recycling heat pumps and out into a small stream. The plant's components are to be stacked and com pacted to conserve heat and to allow waste wate to flow in short runs, for the most part by gravity The building is shaped to hold snow on the roo and sides for natural insulation and is located in man-made dish so that sunlight reflecting of snow-covered hills can be used for heating Methane gas which is generated by the sludg digestion process will be stored in tanks for heat ing the building on rainy days, running an electri generator, and for use as a back-up heat source fo the digesters. The projected result is a treatmen plant that will supply more than 75% of its ow energy requirements, saving roughly $4450/yr i fuel and electricity costs. (Kreager-FIRL)
W77-02354

THE INFLUENCE OF THE RAW WATER CON DITIONING ON THE WORKING DATA OF REVERSE OSMOSIS PLANT TO PRODUC ULTRA-PURE WATER (EINFLUSS DER ROH WASSERKONDITIONIERUNG AUF BETRIEB SDATEN EINER UMKEHROSMOSE-ANLAG ZU REINSTWASSERERZEUGUNG),
O. K. Marquardt.
Vom Wasser, Vol. 45, p 129-158, 1975. 13 fig, tab.

Descriptors: *Reverse osmosis, *Desalination *Waste water treatment, *Reclaimed wate *Saline water, Reclamation, Liquid wastes, Per formance, Ion exchange, Fouling.

The use of reverse osmosis to produce reclaime water from water contaminated by salt discussed, with particular emphasis on the im portance of raw water preconditioning. Less tha satisfactory performance obtained with revers osmosis units in the past is attributed to a lack o raw water pretreatment which is especially impor tant when polyamide hollow fiber-membranes a used in reverse osmosis units. Raw water condi tioning will reduce the fouling index of reverse os mosis units such that special rinses are necessar only at infrequent intervals. The use of raw wate conditioning to reduce the passage of salt throug reverse osmosis units also allows for the effectiv utilization of ion exchange treatment after th reverse osmosis process. (Kreager-FIRL)
W77-02355

SPRAY IRRIGATION SOLVES DISPOSA PROBLEM,
Van Note-Harvey Associates, Princeton, N.J.
W. B. Harvey.
Water and Wastes Engineering, Vol. 13, No. 10, 31-33, October, 1976.

Descriptors: *Irrigation, *Waste water disposal *Waste water treatment, Spraying, *Municipa wastes, Crops, Biological treatment, Tertiary treatment, Aeration, Chlorination, Pumps Valves, Symbiosis, Water reuse, Monitoring Sampling activated sludge, Farms, New Jersey.
Identifiers: *Spray irrigation.

A spray irrigation system that will ultimately remove 1.0 million gallons/day of municipa wastes from direct river discharge is described The system which is located in East Windsor, New Jersey is one of the largest municipal spray irriga tion applications in the northeast, serving a popu lation of about 20,000. Sewage first enters a pump ing station where it is screened for the removal o fibrous material. It is then pumped to a 300,00 gallon equalization basin, and heavier grit and in organic material are settled in a conical section o the basin's bottom. Effluent from the basin is the pumped to activated sludge units, and the flow i subsequently polished in an aerated lagoon whic provides tertiary treatment. After tertiary treat ment, the effluent is chlorinated. Two deep-wel turbine pumps lift the polished effluent to the ir rigation site where 80 acres of hay are treated with 600,000 million gallons/day of the effluent. Dif ferent valve combinations are used to achieve the

proper waste water application over different portions of the site. A network of 13 test wells is located throughout the site to sample groundwater. (Kreager-FIRL)
W77-02356

FEASIBILITY OF HIGH-ENERGY ELECTRON TREATMENT OF MUNICIPAL SLUDGE,
Massachusetts Inst. of Tech., Cambridge. Dept of Electrical Engineering and Computer Science.
J. G. Trump, K. A. Wright, A. J. Sinskey, E. W. Merrill, and D. B. Shah.
American Institute of Chemical Engineers Symposium Series, Vol. 71, No. 151, p 367-374, 1975. 9 fig, 9 ref.

Descriptors: *Waste water treatment, *Sludge treatment, *Municipal wastes, *Ionization, Feasibility studies, *Disinfection, Electronics, Bacteria, Viruses, Parasitism, Economics, Chemical oxygen demand, Radiation.
Identifiers: Ionizing radiation, *Electron beam treatment.

Studies on the feasibility of using high-energy electrons for the disinfection of municipal sludge and waste water are reported. Small quantity irradiation studies using a 3-million electron volt Van de Graaff electron accelerator indicate that high energy electrons can be used to adequately control bacteria, viruses, and parasites. In addition to primary disinfection and deinfestation of waste water and sludge, electron radiation also appears capable of achieving substantial chemical oxygen demand reductions if adequate oxygen is available. Currently, an investigative system for testing 100,000 gallons/day of sludge with 400,000 rads is being constructed. The facility will use a standard 50 kilowatt electron beam system. Capital and operating cost estimates for a modular electron injection unit capable of treating 100,000 gallons/day of sludge are projected at $500,000 and $100,000/yr, assuming that 450,000 rads proves to be an adequate minimum dosage and that electron beam power can be utilized to produce this minimum dosage with an overall utilization efficiency of 33.3%. (Kreager-FIRL)
W77-02357

WASTEWATER REUSE-INDUSTRIAL, MUNICIPAL, OR BOTH,
Maintenance Engineering Corp., Houston, Tex.
B. R. Fritsche, and R. W. Schima.
American Institute of Chemical Engineers Symposium Series, Vol. 71, No. 151, p 242-247, 1975. 3 tab.

Descriptors: *Water reuse, *Waste water treatment, *Industrial wastes, *Municipal wastes, Industrial water, Reclaimed water, Recycling, Symbiosis, Liquid wastes, Dissolved solids, Phosphorus, Ammonia, Sodium, Chlorides.

The reuse of industrial and/or municipal waste water for industrial water needs is discussed. Although municipal waste water is adaptable for limited reuse (cooling water and process water) with minor pretreatment, municipal treatment processes increase the total dissolved solids level (sodium and chloride) significantly which in turn increases water consumption, pretreatment costs, and internal treatment costs. Such increases in total dissolved solids do not occur in industrial process waste water. Also, if municipal waste water is to be used in steam generation systems, phosphorus removal is necessary; ammonia removal may also be necessary, depending on the use of the steam. The only type of industrial waste water that can be considered for reuse is process waste water since cooling water and boiler water blowdowns are normally concentrated with respect to scale formation and corrosion, making these streams impracticable for reuse under circumstances where further concentration occurs or adverse conditions exist. Although industrial waste water may contain process contaminants which must be removed prior to reuse, the utilization of industrial waste water may significantly reduce water consumption requirements. (Kreager-FIRL)
W77-02358

OPEN TANK PURE OXYGEN SYSTEM BEGINS OPERATION,
Illinois State Univ., Normal. Coll. of Applied Science and Technology.
A. R. Jacobson.
Public Works, Vol. 107, No. 9, p 106, September, 1976.

Descriptors: *Activated sludge, *Sewage treatment, *Municipal wastes, *Oxygenation, *On-site tests, Aerobic conditions, Performance, Evaluation, Efficiencies, Treatment facilities.

A pure oxygen activated sludge demonstration system using uncovered tanks has begun operation under a grant from the Environmental Protection Agency at the Metropolitan Denver Sewage Disposal District Number 1 Plant. For the demonstration, one of 36 diffused air activated sludge basins was converted to an open-tank oxygen system by installing rotating active diffusers and associated oxygen control equipment suited to a wide range of loading conditions. Effluent from this tank passes to one of 12 final clarifiers which has been isolated from the rest of the plant. The diffusers rotate slowly in the mixed liquor, producing very fine micron-size bubbles that achieved 90% or greater oxygen transfer. Electrical signals from dissolved oxygen sensors automatically regulate pneumatic oxygen control valves to satisfy the oxygen demand for a given point in the basin. The limiting factor of the system will be the solids and hydraulic loadings of the single clarifier. During the last phase of the project, the flow will be increased in steps from its current 10 million gallons/day until the upper operating limit of the system is determined. (Kreager-FIRL)
W77-02359

PACKAGED PLANT FOR VIRGIN ISLANDS.
For primary bibliographic entry see Field 8G.
W77-02360

GLASS COATED STEEL TANKS.
For primary bibliographic entry see Field 8G.
W77-02361

EFFICIENCY OF DIFFUSED AERATION SYSTEMS IN WASTEWATER TREATMENT,
British Columbia Univ., Vancouver. Dept. of Civil Engineering.
D. S. Mavinic, and J. K. Bewtra.
Journal Water Pollution Control Federation, Vol. 48, No. 10, p 2273-2283, October, 1976. 11 fig, 1 tab, 7 ref.

Descriptors: *Activated sludge, *Waste water treatment, *Aeration, *Oxygenation, Biological treatment, Bubbles, Flow characteristics, Efficiencies, Performance.
Identifiers: Diffused aeration systems.

Factors affecting the oxygenation efficiency of diffused aeration systems employed in activated sludge waste water treatment are examined. A process of aeration using a countercurrent flow of air bubbles and waste water is shown to result in increased contact time and thus higher oxygenation efficiencies. The operating conditions of the system are such that the average velocity of the water is equal to or less than the velocity of the rising air bubble in order to provide maximum contact times for countercurrent flow of air and water. The process can possibly be adapted to existing conventional aeration systems so that treatment efficiency can be improved. (Kreager-FIRL)
W77-02362

WASTEWATER PLANT DOES NICELY WITHOUT NATURAL GAS, THANK YOU,
Reading Sewage Treatment Plant, Pa.
L. Karnat.
Water and Wastes Engineering, Vol. 13, No. 10, p 25-26, October, 1976.

Descriptors: *Sewage treatment, *Treatment facilities, *Methane, *Energy conversion, *Digestion, Monitoring, Waste water treatment, Municipal wastes, Cities, Pennsylvania.
Identifiers: Reading(Penn), Fuel generation.

The use of on-site methane generation for supplying waste water treatment fuel gas needs at the sewage treatment plant in Reading, Pennsylvania is described. The plant produces an average of 150,000 cu ft of methane/day which is enough to supply heat for the two primary digesters and one secondary digester plus heat for two of the plant buildings. Methane is metered via two rotating-vaine type positive displacement meters installed on each of the two primary digesters. While measuring methane production, the meters also indicate whether the digesters are operating properly and show the amount of methane used to heat the digesters. The meters are also equipped with flow-totalizing readouts to provide statistical information on methane production required by the Commonwealth of Pennsylvania. Surplus methane is burned off by flares. (Kreager-FIRL)
W77-02363

DEGRADATION OF NTA ACID DURING ANAEROBIC DIGESTION,
Municipal Environmental Research Lab., Cincinnati, Ohio.
L. Moore, and E. F. Barth.
Journal Water Pollution Control Federation, Vol. 48, No. 10, p 2406-2409, October, 1976. 3 fig, 1 tab, 3 ref.

Descriptors: *Waste water treatment, *Activated sludge, *Biodegradation, *Detergents, *Anaerobic conditions, Organic acids, Salts, Sludge, Performance, Evaluation, Biological treatment, *Nitrilotriacetic acid.
Identifiers: Sodium nitrilotriacetic acid, Detergent additives.

The degradability of the sodium salt of nitrilotriacetic acid, a proposed substitute for tripolyphosphate in synthetic detergent formulations, during anaerobic digestion of primary sludge and a mixture of primary and waste activated sludge was investigated. Experiments involving the addition of 20 milligrams/liter of the nitrilotriacetic acid salt to an anaerobic system containing only primary sludge did not reveal any degradation of the salt over a period of 120 days. However, when 20 milligrams/liter of the salt was added to an anaerobic system containing 50% primary sludge and 50% waste activated sludge that was acclimated to the degradation of sodium nitrilotriacetate, almost complete degradation was observed after 2 months. When this mixture of primary sludge and acclimated waste activated sludge was gradually returned over a 20-day period to a daily feed consisting entirely of primary sludge, degradation continued, indicating that the acclimated culture can be retained in the digestion process when the daily feed is returned to zero. (Kreager-FIRL)
W77-02364

DIGESTION IS A GOOD EGG IN LOS ANGELES,
J. F. Kam, and J. F. Schank.
Water and Wastes Engineering, Vol. 13, No. 10, p 28-29, October, 1976.

Descriptors: *Digestion tanks, *Construction, *Design criteria, *Waste water treatment, *Concrete structures, Equipment, Materials, Scum, Coatings, Corrosion control, Anaerobic conditions, California.
Identifiers: Grit, Los Angeles(Calif).

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The use of egg-shaped anaerobic digestion tanks for a waste water treatment plant in the city of Los Angeles is reported. The tanks which are patterned after a German design possess the advantage that they don't accumulate grit and scum. The shell of the digester is built with post-tensioned concrete, with the bottom of the container being as steep as possible (generally under 45 degrees inclined from verticle) so that the digested sludge flows by gravity into the tip of the hopper. The digester reduces in area in an upward direction so that the scum area stays small compared with the digesting area. Dead corners that form deposit are avoided. Digester gas is bubbled at the circumference of the lower tank area to intensify the digestion and prevent scum formation. Screw impellers for scum destruction are installed at the top of the digesters. The inside of the digester above the sludge level is epoxy coated for corrosion protection. The middle section of the digester is constructed in sections (like an orange peel), whereby the forming and scaffolding are built for one section at a time, rotated into place, and used repeatedly. (Kreager-FIRL)
W77-02365

PILOT PLANT TRAVELS ON WHEELS.
The American City and County, Vol. 91, No. 10, p 98, October, 1976.

Descriptors: *Waste water treatment, *Pilot plants, *Sludge, *Dewatering, *Municipal wastes, Cities, *Treatment facilities, Evaluation, Performance, Alabama.
Identifiers: Birmingham.

A mobile pilot plant for evaluatiang the effectiveness of a clay-polymer drainage and evaporation system in improving the sludge clarification capabilities of two waste water treatment plants in the city of Birmingham, Alabama is described. The mobile plant is able to treat up to 100 million gallons/day of water during the clay-polymer test. Tests at a treatment facility with an 8.5 million gallons/day flow revealed that polymer and clay levels of 2.0 ppm and 8.0 ppm, respectively, were sufficient to obtain results that were superior to those obtained with conventional alum treatment. At a treatment plant with an average flow up to 50 million gallons/day, 1.2 ppm of polycationic polymer and 9.0 ppm of clay were used. The clay-polymer system produces finished water of good clarity and a low volume of sludge with good handling and dewatering properties. (Kreager-FIRL)
W77-02366

FLUID-BED REACTOR MAY CUT SEWAGE COSTS.
The American City and County, Vol. 91, No. 10, p 26, October, 1976.

Descriptors: *Biological treatment, *Activated sludge, *Waste water treatment, *Nitrification, *Denitrification, Domestic wastes, Municipal wastes, Pilot plants, Efficiencies, Evaluation, Performance, Economics, Tertiary treatment, Biomass.

A fluidized bed biological waste water treatment process that is potentially capable of reducing treatment plant capital costs for some municipalities is described. The process provides secondary biological treatment, nitrification, and denitrification for domestic sewage. The fluidized-bed reactors take up only one-fifth the space a standard activated sludge system requires. The process eliminates the huge concrete tanks and basins required for conventional waste water treatment by substituting compact fluidized bed reactors containing bacteria-coated media with a high biomass concentration and a short detention time. A pilot installation located at an advanced waste water treatment plant is achieving better than 99% denitrification. (Kreager-FIRL)
W77-02367

SANDWICH CONSTRUCTION G.R.P.
For primary bibliographic entry see Field 8G.
W77-02368

THERMOPHILLIC BIO-OXIDATION OF HIGH-STRENGTH ORGANIC WASTEWATERS AND SLUDGES,
Camp, Dresser and McKee Inc., Boston, Mass.
A. A. Kalinske.
American Institute of Chemical Engineers Symposium Series, Vol. 71, No. 151, p 34-40, 1975. 2 fig, 3 tab, 13 ref.

Descriptors: *Biological treatment, *Waste water treatment, *Sludge treatment, *Thermophilic bacteria, *Activated sludge, Solid wastes, Temperature, Aerobic conditions, Microorganisms, Biochemical oxygen demand, Organic compounds, Digestion, Sewage sludge, Feasibility studies, *Oxidation.
Identifiers: Composting, *Bio-oxidation.

Processes for the thermophilic bio-oxidation of waste water and sludges containing high levels of organics are discussed. Thermophilic activated sludge treatment of waste waters with high levels of soluble organics appears to be feasible, especially if the waste water originates at a temperature of 40C or higher. At a 5-day biochemical oxygen demand above about 30 g/liter, sufficient heat can be generated so that the process is self-sustaining as far as temperature is concerned. Thermophilic organisms do not appear to have bioflocculating properties; thus their removal by plain settling is not possible. Aerobic digestion of sewage sludges and other organic solid wastes in liquid suspensions at high mesophilic and thermophilic temperatures (35-60C) is possible and can be self-sustaining at volatile solids concentrations above 3%. Composting of organic solid wastes by thermophilic aerobic organisms also appears feasible. Tests with a mechanical composting unit handling dewatered sewage solids having 75% moisture revealed that at a temperature of 60C and a retention time of about 6 days all pathogens were killed or inactivated. Recycle and forced aeration were used to achieve a final composted solids with a moisture content of 25% and a 6-day stabilization time. (Kreager-FIRL)
W77-02369

STUDIES OF THE REMOVAL OF AMMONIA NITROGEN BY ION EXCHANGE,
Greeley and Hansen, Chicago, Ill.
T. E. Wilson, and M. D. Riddell.
American Institute of Chemical Engineers Symposium Series, Vol. 71, No. 151, p 118-125, 1975. 4 fig, 4 tab, 9 ref.

Descriptors: *Ion exchange, *Waste water treatment, Ammonia, *Zeolites, *Activated sludge, *Nitrogen compounds, Calcium, Pilot plants, Performance, Effluents, Liquid wastes, Municipal wastes, Treatment facilities, Separation techniques.
Identifiers: Clinoptilolite, *Ammonia nitrogen.

Pilot studies to evaluate the effectiveness of an ion exchange process using the natural zeolite, clinoptilolite, for removing ammonia nitrogen from the filtered secondary effluent generated by an activated sludge municipal waste water treatment plant were conducted. Ion exchange beds (6-feet deep) consisting of two columns with 3 ft of media were used. A sodium chloride-sodium hydroxide brine was generally used for regeneration of clinoptilolite. Effluent ammonia nitrogen levels often averaged less than 1.0 milligrams/liter for one-column operational mode but commonly averaged closer to 1.5 milligrams/liter for two-column operation. The calcium content of the influent did not appear to affect either the effluent ammonia concentration or the clinoptilolite's ammonia capacity. Calcium breakthrough tended to precede ammonia breakthrough and thus might be used as an early indicator of ammonia breakthrough. Both the ammonia and calcium capacities of the clinoptilolite tended to decrease with increasing hydraulic loading. Activated carbon pretreatment had no effect on effluent ammonia concentration. (Kreager-FIRL)
W77-02370

RECOVERY AND REUSE OF ALUM FROM WATER FILTRATION PLANT SLUDGE BY ULTRAFILTRATION,
Massachusetts Univ., Amherst. Environmental Engineering.
E. E. Lindsey, and C. Tongkasame.
American Institute of Chemical Engineers Symposium Series, Vol. 71, No. 151, p 185-192, 1975. 5 fig, 2 tab, 6 ref.

Descriptors: *Sludge treatment, *Recycling, *Aluminum, *Waste water treatment, *Filtration, Byproducts, Membrane processes, Economics, Coagulation, Sludge disposal, Symbiosis, Color, Organic compounds
Identifiers: Alum, *Ultrafiltration.

A system for the recovery and reuse of alum from water filtration plant sludge by ultrafiltration is described. The settled, used sludge from water treatment is acidified with sulfuric acid to a pH of about 2.5, and the clarified overflow from the acidification is subjected to ultrafiltration at a pressure differential of about 50 lb/sq in with an acid-resistant synthetic copolymer membrane. A portion of the solution which does not go through the membrane contains most of the color and the high molecular weight organics removed by the alum floc. Since the underflow from acidification is relatively small in volume and more easily dewaterable, there is a greatly reduced problem in ultimate disposal. The solution through the membrane contains up to 90% of the original aluminum in a soluble form that is suitable for reuse as a coagulant after pH adjustment. A cost comparison with other means of sludge disposal such as landfill shows that the recovery system can result in significant savings. (Kreager-FIRL)
W77-02371

ASPECTS OF SLUDGE TREATMENT,
F. A. Shabi, and M. J. Hanbury.
Effluent and Water Treatment Journal, Vol. 16, No. 7, p 343-346, 350-351, July, 1976. 2 fig, 5 tab, 7 ref.

Descriptors: *Sludge treatment, *Dewatering, *Coagulation, *Anaerobic conditions, *Oxidation, Waste treatment, Filtration, Centrifugation, Flocculation, Solid wastes, *Waste water treatment, Liquid wastes, Separation techniques, Treatment facilities, Polyelectrolytes.

Waste water sludge treatment processes being utilized in Great Britain are reviewed. The most widely used sludge treatment process in Great Britain is anaerobic digestion which serves about half of Britain's population. Dewatering by mechanical means (filter press, vacuum filtration, and centrifugation), however, is becoming increasingly more attractive both in terms of cost and convenience. Sludge pretreatment to achieve flocculation or coagulation of the sludge particles is achieved either by thermal conditioning or by the addition of chemical coagulants. The development of polyelectrolytes which can be added in very small quantities (about 1%) to achieve sludge particle coagulation has improved the efficiency of sludge mechanical dewatering systems as illustrated by a sludge concentrator which is capable of producing a cake with a solids content in the range of 8-16%. The use of wet air oxidation in waste water treatment is another means of making the residual sludge more amenable to dewatering. At one facility using this waste water treatment modality, the utilization of overloaded drying beds was extended by eight-fold, while the sludge volume was reduced by over 80%. (Kreager-FIRL)
W77-02372

A DISCOURSE ON THE BIOCHEMICAL OXIDATION OF SEWAGE,
T. Stones.
Effluent and Water Treatment Journal, Vol. 16, No. 7, p 352-355, July, 1976. 4 tab, 21 ref.

Descriptors: *Sewage treatment, *Biological treatment, *Kinetics, *Biochemical oxygen demand, *Dissolved oxygen, Domestic wastes, Nitrification, *Oxidation, Chemical reactions, *Waste water treatment, Oxygen demand.

The kinetics of the biochemical oxidation of settled domestic sewage was investigated. Data obtained from experiments in which the dissolved oxygen contents of portions of 1/100 dilution of settled domestic sewage were determined at various intervals during incubation over 20 days at 20C were substituted into an expression for a second-order reaction. The results was a reasonably constant value throughout a period of about 10 days. During this period, therefore, the course of biochemical oxidation closely followed a second-order reaction, with the rate of oxidation at any instant over this period being governed jointly by the residual dissolved oxygen concentration and the unsatisfied biochemical oxygen demand. After a slight fall in the velocity coefficient value during the first 5 days, however, there was a gradual increase which became more rapid after the 10th day. This was presumably due to the onset of nitrification, the occurrence of which did not become apparent until more than 15 days had elapsed. (Kreager-FIRL)
W77-02373

POLYMERS CUT COST OF PHOSPHORUS REMOVAL,
Thomas (Frank A.) and Associates, Inc., Willoughby, Ohio.
T. G. Check.
Water and Wastes Engineering, Vol. 13, No. 8, p 23-24, August, 1976. 1 fig, 2 tab.

Descriptors: *Tertiary treatment, *Phosphorus, *Polymers, *Waste water treatment, *Feasibility studies, Pilot plants, Costs, Ions, Coagulation, Flocculation, Sludge, Ohio.

A pilot plant study at a tertiary waste water treatment plant was conducted to investigate the feasibility of substituting wet or dry anionic polymers for sodium aluminate in the phosphorus removal system. The purpose of sodium aluminate or polymer addition is to achieve secondary coagulation and subsequent flocculation. Both Calgon WT 3000 (a dry powder) and Nalco 7744B (a liquid polymer) proved to be effective polymers for achieving the above purpose, with phosphorus concentrations of less than 1.0 milligrams/liter being achieved. Solids carryover was 10 milligrams/liter. Each polymer also resulted in the production of less sludge, thus reducing sludge pumping and lagoon capacity requirements. Using bulk delivery chemical costs, the total expense per month for the dry and liquid polymers is $80 and $116, respectivelyc as compared with $1100 for sodium aluminate. (Kreager-FIRL)
W77-02374

TOWARD A MORE MEANINGFUL INDEX OF SLUDGE QUALITY,
Carnegie-Mellon Univ., Pittsburgh, Pa.
For primary bibliographic entry see Field 5G.
W77-02378

INSTANTANEOUS METERING AIDS - ACTIVATED SLUDGE PLANT,
Suffolk County Dept. of Environmental Control, Hauppauge, N. Y. Operations Div.
For primary bibliographic entry see Field 5A.
W77-02381

ALARM SYSTEM CONTINUALLY MONITORS PLANT FUNCTIONS,
For primary bibliographic entry see Field 8C.
W77-02382

THEORETICAL MODEL FOR A SUBMERGED BIOLOGICAL FILTER,
Clarkson Coll. of Technology, Potsdam, N. Y. Dept. of Civil and Environmental Engineering.
P. A. Jennings, V. L. Snoeyink, and E. S. K. Chian.
Biotechnology and Bioengineering, Vol. 18, No. 9, p 1249-1273, September, 1976. 12 fig, 2 tab, 16 ref.

Descriptors: *Waste water treatment, *Biological treatment, *Mathematical models, *Kinetics, *Liquid wastes, Waste treatment, Equations, Surfaces, Model studies, *Filters.
Identifiers: *Biological filters.

A mathematical model for describing the biological removal of a single substrate from waste water in a porous bed of biolayer coated particles assuming plug flow and steady-state conditions is described. The model uses the nonlinear Monod expression for the substrate utilization rate. The approximation of this Monod expression by a first order rate expression yields accurate results for a much wider range of bulk concentrations than might be expected from inspection of the Monod half-velocity coefficient for a given substrate. Percent removal of substrate is a weak function of biolayer thickness when the thickness is greater than a rather small limiting value but is a strong function of particle radius (and thus biolayer surface area) for a wide range of parameter values including those of common interest. (Kreager-FIRL)
W77-02385

ENVIRONMENTAL IMPACTS OF LAND APPLICATION OF SLUDGE,
Metropolitan Sanitary District of Greater Chicago, Ill. Dept. of Research and Development.
D. R. Zenz, J. R. Peterson, D. L. Brooman, and C. Lue-Hing.
Journal Water Pollution Control Federation, Vol. 48, No. 10, p 2332-2342, October, 1976. 2 fig, 8 tab, 6 ref.

Descriptors: *Sludge disposal, *Soil amendments, *Reclamation, *Illinois, *Monitoring, Biochemical oxygen demand, Suspended solids, Coliforms, Surface water, Groundwater, Water quality, On-site investigations, Waste water treatment, Viruses, Fish, Metals, Recycling.
Identifiers: Land application, Fulton county(Ill), Chicago area(Ill).

The results of a 4-year environmental monitoring program conducted by the Metropolitan Sanitary District of Greater Chicago to determine the effects of land application of sludge in Fulton County are reported. Surface discharges from fields receiving digested sludge averaged suspended solids, biochemical oxygen demand, and fecal coliform levels of 60 milligrams/liter, 6.0 milligrams/liter, and 36 counts/100 milliliters (geometric means), respectively. The water quality of a major stream which drains the digested sludge application project was unaffected by surface water discharges, and groundwater monitoring wells showed no evidence of groundwater contamination. After 3 years of sludge application, metal levels in corn grain grown on digested sludge amended soils showed no significant increase. Virus levels monitored over a 2-year period at three surface water monitoring points were not influenced by sludge application to the surrounding watershed. Fish living in several reservoirs which receive discharges from fields to which digested sludge has been applied were not influenced by such applications. (Kreager-FIRL)
W77-02391

A STUDY OF BACTERIAL AEROSOLS AT A WASTEWATER IRRIGATION SITE,
Army Medical Bioengineering Research and Development Lab., Frederick, Md.
For primary bibliographic entry see Field 5A.
W77-02392

LANDFILL MANAGEMENT WITH LEACHATE RECYCLE AND TREATMENT: AN OVERVIEW,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
F. G. Pohland.
In: Symposium on Gas and Leachate from Landfills: Formation, Collection, and Treatment, March 25-26, 1975, New Brunswick, New Jersey, Department of Environmental Science, Rutgers University, p 159-167. 9 fig, 2 tab, 3 ref.

Descriptors: *Leachate, *Landfills, *Waste disposal, *Waste treatment, *Recycling, Organic compounds, Methane, Biological treatment, Adsorption, Ion exchange, Inorganic compounds, Simulation analysis, Efficiencies.

An overview of a leachate recycle/treatment concept is presented based on experiments with a simulated landfill constructed so that leachate could be recycled back in a manner analogous to the operation of an anaerobic trickling filter. Recirculation of leachate through the landfill promotes a more rapid development of anaerobic activity and methane fermentation, an increase in the rate and predictability of biological stabilization of organic pollutants in the waste, a significant decrease in the time required for stabilization, and a reduction of the potential for environmental impairment. Leachate recirculation with pH control and initial sludge seeding further enhances treatment efficiency so that the time required for biological stabilization of readily available organic pollutants in the leachate is reduced to months rather than years. The application of separate anaerobic and aerobic biological processes has also proven satisfactory for leachate treatment. Carbon adsorption is effective in removing residual organics and inorganics in the effluent when it is followed by mixed resin ion exchange. (See also W77-02394) (Kreager-FIRL)
W77-02411

SOLID WASTE DEGRADATION DUE TO SHREDDING AND SLUDGE ADDITION,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5E.
W77-02412

ECONOMIC ANALYSIS OF EFFLUENT GUIDELINES: CANE SUGAR REFINING,
Development Planning and Research Associates, Inc., Manhattan, Kans.
M. L. David, and R. J. Buzenberg.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-248 599, Price codes: A06 in paper copy, A01 in microfiche. Report No. EPA-230/2-75-003, November 1975. 109 p. 2 fig., 34 tab. 68-01-1533.

Descriptors: *Economic impact, *Standards, *Water pollution control, *Effluents, *Sugar cane, Prices, Costs, Employment, Social impact, Industrial production, Foreign trade, Pollution abatement, Pricing, Industrial plants, Industrial wastes, Profits.
Identifiers: *Cane sugar refining industry, *Effluent guidelines, Plant closures.

This study supplements the EPA Effluent Limitation Guidelines analysis for the cane sugar refining industry by estimating the broader economic effects, such as price increases, effects on employment, foreign trade implications, and plant closures, which might result from application of pollution control technologies. Though all but 3 of the

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29 refineries are over 50 years old, all are well maintainedand technologically up-to-date. Imposition of effluent limitation standards are not expected to raise prices, though they will have a negative impact on the already weak profit structure of the industry. It is estimated that 7% of the plants with 5% of industry capacity will become marginal and 10% of the plants with 6% of industry capacity will probably close, as a result. Three to five small, rural communities, whose economic life is considerably dependent upon a cane sugar refinery and the related activities of area sugar cane growers and mills, will be significantly affected by these closures. Balance of payments effects will be felt to the degree that imported raw sugar was utilized and resulted in refined sugar exportation, and to the degree that such production losses will be affected by the increased use of substites. Compensatory actions of the Secretary of Agriculture will also be a very significant.factor. (Luedtke-Wisconsin)
W77-02414

DEVELOPMENT DOCUMENT FOR EFFLUENT LIMITATIONS GUIDELINES AND NEW SOURCE PERFORMANCE STANDARDS FOR THE FABRICATED AND RECLAIMED RUBBER SEGMENT OF THE RUBBER PROCESSING POINT SOURCE CATEGORY,
Environmental Protection Agency, Washington, D. C. Effuent Guidelines Div.
R. J. Kinch.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-241 916, Price codes: A11 in paper copy, A01 in microfiche. Report No. EPA-440/1-74-030-a, December 1974. 249 p. 12 fig., 44 tab., 28 ref.

Descriptors: *Industrial wastes, *Technology, *Standards, *Effluents, *Waste water treatment, Economic impact, Capital costs, Annual costs, Pollution abatement, Federal Water Pollution Control Act, Water reuse, Recycling, Pollutants, Industries, Treatment facilities.
Identifiers: *Rubber processing industry, *Effluent guidelines.

Effluent limitation guidelines and new source performance standards for the fabricated and reclaimed rubber segment of the rubber processing industry to be achieved by July 1, 1977 and July 1, 1983 were developed. The industry is categorized by three major groups: (1) general molded, extruded, and fabricated products, (2) wet digestion, pan, dry digestion, and mechanical reclaimed rubber, and (3) latex-based products. This breakdown has been further subcategorized into seven subcategories on the basis of the manufacturing processes characteristics involved. Facility size, process waste water flow rates and loadings, costs of control technologies, final product, raw materials, plant age, geographical location, air pollution equipment, and the nature and treatability of waste waters using biological and physical/chemical treatment systems were considered. General molded, extruded, and fabricated rubber plant wastes should be treated for suspended solids, oil and grease, lead, and pH. BPCTCA, BATEA, and NSPS are equivalent for this group excet for an allowance for wet scrubbers. Incremental treatment costs to the small and medium size plants in this group are high. Reclaimed rubber plant waste waters are contaminated with BOD, COD, suspended solids, oil, and acidity/alkalinity, while latex product waste waters must be treated for BOD, suspended solids, oil, chromium or zinc, and pH. (Luedtke-Wisconsin)
W77-02415

DEVELOPMENT DOCUMENT FOR EFFLUENT LIMITATIONS GUIDELINES AND NEW SOURCE PERFORMANCE STANDARDS FOR THE FORMULATED FERTILIZER SEGMENT OF THE FERTILIZER MANUFACTURING, POINT SOURCE CATEGORY,
Environmental Protection Agency, Washington, D.C. Effluent Guidelines Div.
E. E. Martin.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-240 863, Price codes: A04 in paper copy, A01 in microfiche. Report No. EPA 440/1-75-042-a, January 1975. 79 p. 11 fig., 2 tab., 24 ref.

Descriptors: *Fertilizers, *Industrial wastes, *Standards, *Effluents, Ammonium compounds, Pollution abatement, Water pollution control, Waste water treatment, Water reuse, Recycling, Federal Water Pollution Control Act, Technology, Economic impact, Industrial plants, Costs.
Identifiers: *Zero discharge, *Effluent guidelines, Ammonium sulfate.

Effluent limitation guidelines and new source performance standards for the ammonium sulfate and mixed and blended segment of the fertilizer industry to be achieved by July 1, 1977 and July 1, 1983 were developed. Synthetic and coke oven byproduct production of ammonium sulfate are included. The mixed and blended fertilizers group represent by far the largest number of individual process plants in the overall fertilizer category. Use of treatment technologies such as manufacturing process control, recycle water systems, recovery and reuse of waste water, and dry collectors for air borne solids, which are currently utilized by better plants, make the recommended best practicable control technology currently available, the best available technology economically achieveable, and the new source performance standards identical and capable of zero discharge of process waste water pollutants to navigable waters. Factors considered in the analysis included total cost of technology application, size and age of facilities and equipment, the process employed, engineering aspects of control technology application, process changes, and ambient environmental impact including energy requirements. (Luedtke-Wisconsin).
W77-02419

DEVELOPMENT DOCUMENT FOR EFFLUENT LIMITATIONS GUIDELINES AND NEW SOURCE PERFORMANCE STANDARDS FOR THE PRIMARY ALUMINUM SMELTING SUBCATEGORY OF THE ALUMINUM SEGMENT OF THE NONFERROUS METALS MANUFACTURING, POINT SOURCE CATEGORY,
Environmental Protection Agency, Washington, D. C. Effluent Guidelines Div.
G. S. Thompson.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-240 859, Price codes: A07 in paper copy, A01 in microfiche. Report No. EPA-440/1-74-019-D, March 1974. 150 p. 17 fig, 10 tab, 11 ref.

Descriptors: *Industrial wastes, *Aluminum, *Standards, *Technology, *Effluents, Capital costs, Operating costs, Pollution abatement, Water pollution control, Federal Water Pollution Control Act, Economic impact, Water reuse, Wastes water treatment, Industries.
Identifiers: *Effluent guidelines, Primary aluminum smelting.

Effluent limitation guidelines and standards of performance for the primary aluminum smelting industry to be achieved by July 1, 1977 and July 1, 1983 were developed. The best practicable control technology currently available (BPCTCA) is treatment of wet scrubber water and other effluents to precipitate the fluorides, to decrease the concentration of suspended solids, and to allow recycling of the treated water. Further lime treatment of bleed streams and filtrates constitutes the best available technology economically achievable. The best available demonstrated control technology consists of dry scrubbing of potline air and the control and treatment of other fluoride-containing waste streams by recycling and treatment of bleed streams by lime precipitation. Approximately one-third of the 31 primary aluminum plants have met the 1977 guidelines. The remainder of the industry can achieve these standards by application of the BPCTCA at an estimated capital investment of about $10/annual metric ton and an increased operating cost of about $4.6/metric ton. It is estimated that an additional investment of $3.8/annual metric ton and an operating cost of $1.13/metric ton would be required to decrease pollutant discharges to the 1983 level. (Luedtke-Wisconsin)
W77-02421

DEVELOPMENT DOCUMENT FOR EFFLUENT LIMITATIONS GUIDELINES AND NEW SOURCE PERFORMANCE STANDARDS FOR THE PHOSPHORUS DERIVED CHEMICALS SEGMENT OF THE PHOSPHATE MANUFACTURING POINT SOURCE CATEGORY,
Environmental Protection Agency, Washington, D.C. Effluent Guidelines Div
For primary bibliographic entry see Field 5G.
W77-02431

ENVIRONMENTAL TRUST FUNDS: AN EVALUATION,
RIVUS, Inc., Glen Burnie, Md.
For primary bibliographic entry see Field 5G.
W77-02432

ECONOMIC ANALYSIS OF EFFLUENT GUIDELINES FOR SEAFOOD PROCESSING INDUSTRY: (FISH MEAL, SALMON, BOTTOM FISH, CLAMS, OYSTERS, SARDINES, SCALLOPS, HERRING, ABALONE),
Development Planning and Research Associates, Inc., Manhattan, Kans.
D. L. Jordening, and T. R. Eystone.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-247 307, Price codes: A09 in paper copy, A01 in microfiche. Report No. EPA-230/2-74-047, October 1975. 180 p. 80 tab. 68-01-1533

Descriptors: *Economic impact, *Standards, *Water pollution control, *Effluents, *Food processing industry, Clams, Oysters, Salmon, Bottom fish, Industrial wastes, Industrial plants, Industrial production, Social impact, Employment, Prices, Pricing, Costs, Profits, Investment, Herrings, Pollution abatement, Foreign trade.
Identifiers: *Seafood processing industry, *Effluent guidelines, Fish meal, Menhaden, Anchovy, Sardines, Scallops, Abalone, Plant closures.

This study supplements the EPA Effluent Limitation Guidelines analysis for seafood processing industry by estimating the broader economic effects of the application of required pollution control technology. The seafood industry is characterized by a large number of small plants (726), decreases in the number of plants over time, and important competition from foreign producers. Economies of scale exist, both in processing and in effluent treatment. Opportunities to pass on total increased costs of $5,541,000 for BPT Standards and $11,157,000 for BPT plus BAT standards are limited because of the intense competitiveness of the industry. Plant closure impacts are expected to be greatest in the Alaskan salmon industry, nonmechanized bottom fish processing and clam processing, and the West Coast oyster industry. It is estimated that meeting BPT guidelines would close 42 plants and complying with BAT guidelines would close an additional 86 plants. Production impacts would be minimal since most of the closures would be small plants and the remaining plants have excess capacity. Good reemployment opportunities exist within the industry and net unemployment from BPT is estimated at 190 or 510 from BPT plus BAT. New Source Performance Standards will not curtail new investment in the industry. (Luedtke-Wisconsin)
W77-02433

ECONOMIC ANALYSIS OF EFFLUENT GUIDELINES: BEET SUGAR INDUSTRY,
Development Planning and Research Associates, Inc., Manhattan, Kans.
M. L. David, R. J. Buzenberg, and C. C. Jones.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-248 844, Price codes: A07 in paper copy, A01 in microfiche. Report No. EPA 230/2-75-002, August 1975. 128 p. 5 fig., 35 tab. 68-01-1533.

Descriptors: *Economic impact, *Standards, *Water pollution control, *Effluents, Prices, Employment, Costs, Social impact, Industrial production, Foreign trade, Industrial wastes, Pollution abatement, Industrial plants, Pricing, Profits.
Identifiers: *Beet sugar industry, *Effluent guidelines, Zero discharge, Plant closures.

This study supplements the EPA Effluent Limitation Guidelines analysis for the beet sugar industry by estimating the broader economic effects of the application of certain of these control technologies. Following a description of the number, types, size, and location of plants, financial profiles of representative model plants, pricing practices, and supply/demand relationships in the industry, pollution control costs are superimposed on the model plant financial profiles to analyze microeconomic effects such as unit cost increments, price increases, and potential closures. The macroanalysis effects on employment, communities, and foreign trade are also evaluated. Imposition of effluent limitation standards is not expected to raise prices because large portions of industry are already at or very near zero discharge levels. Potential closures due to imposition of zero discharge standards are estimated to be 7 to 17 plants representing between 8% and 26% of beet sugar production. A discharge standard of .5 pounds of BOD in 1977 is estimated to cause 4 to 10 plant closures. New plants are expected to come on line to offset nearly all of these potential closures. While employment effects are expected to be minimal, the effects on a given community could be greater due to the loss of growers, since each plant represents about 300 growers. (Luedtke-Wisconsin)
W77-02434

REMOVAL BENEFITS: IT CAN BE TOO COSTLY,
Kansas City Water Dept., Mo.
D. R. Boyd, J. R. Popalisky, J. D. Reece, and D. McMurtrey.
Water and Waste Engineering, Vol. 13, No. 2, p 42-44, 1976. 4 fig.

Descriptors: *Analytical techniques, *Organoleptic properties, *Nutrient removal, *Waste water treatment, *Water treatment, Missouri River, Agricultural runoff, Treatment facilities, Comparative benefits.
Identifiers: Non-point pollution sources, Kansas City(Mo).

The case against requiring complete nutrient removal at sewage treatment facilities discharging into the Missouri River with particular reference to Kansas City, Missouri, is described. Based on current minimum flows for the Missouri River, the quantity of the effluent discharged from Kansas City, never exceeds 1% of the river's flow. Ninety-five percent of the sewage is discharged directly into the river after primary treatment, while the remainder undergoes secondary treatment before being discharged. In addition, land use in the drainage area is predominantly agricultural and produces much nutrient enrichment in the form of decayed matter, animal wastes, and fertilizers. Because of these factors, sewage wastes from point sources are of comparatively minor significance and advanced waste treatment facilities at Kansas City would have an insignificant effect on the water quality in the receiving stream. The incidence of organoleptic properties in the Kansas City's water supply generated an analytical procedure for determining the relative amounts and general classification of the agricultural problem organics. The procedure involves sample concentration followed by detection using gas chromatography and infrared spectrometry. A schematic diagram represents the procedure. The method is used as an integral part of the water treatment plant's daily operation and was the basis for plant modification to remove turbidity and organics. (Luedtke-Wisconsin)
W77-02436

KINETICS OF THE ACTIVATED CARBON-STEAM REACTION,
Connecticut Univ., Storrs. Dept. of Chemical Engineering.
H. E. Klei, J. Sahagian, and D. W. Sundstrom.
Industrial and Engineering Chemistry, Process Design and Development, Vol 14, p 470, October 1975. 5 fig, 1 tab, 12 ref. OWRT A-045-CONN(2), 14-31-0001-3807.

Descriptors: *Activated carbon, *Kinetics, *Waste water treatment, *Water pollution, Adsorption, Heat transfer.
Identifiers: *Thermal regeneration, *Carbon-steam reaction, Gas-flow rate, External mass transfer rate.

A bed of activated carbon was reacted with steam at temperatures between 1400 and 1500F and steam concentrations between 10.7 and 53.4 mol % to determine the kinetic rate equations which predict the reaction rate. In addition, since activated carbon is a porous solid, the effect of gas flow rate through the bed was studied to see if mass transfer was important. The reaction rate was found to vary with the 0.58 power on the steam concentration with an activation energy of 63.6 kcal/g-mol. The gas rate did have some effect on the reaction rate but it appeared not to be sufficient to shift the controlling step to mass transfer. (de Lara-Connecticut)
W77-02519

REMOVAL OF ALGAE FROM FLORIDA LAKES BY MAGNETIC FILTRATION,
Florida Univ., Gainesville. Dept. of Environmental Engineering Sciences.
G. Bitton, J. L. Fox, and H. G. Strickland.
Applied Microbiology, Vol. 30, No. 6, p 905-908, December 1975. 2 fig, 3 tab, 16 ref. OWRT A-030-FLA(1). 14-31-0001-5009.

Descriptors: *Viruses, Filtration, *Florida, Lakes, Waste water treatment, Algae, Hydrogen ion concentration.
Identifiers: *Magnetic filtration.

Magnetic filtration was used for the removal of algal populations present in five lakes located in the vicinity of Gainesville, Florida. It was found that the use of this technique enabled a good removal (94%) of algal cells from three lakes where the pH was around 7. The other two lakes, with a higher pH, displayed a lower removal. However, the treatment was greatly improved by lowering the pH from 9.5 to 6.5. (Morgan-Florida)
W77-02522

A SENSITIVE ALGAL ASSAY: AN IMPROVED METHOD FOR ANALYSIS OF FRESHWATERS,
Connecticut Univ., Storrs. Inst. of Water Resources.
For primary bibliographic entry see Field 5A.
W77-02524

DISTRIBUTION OF AQUATIC YEASTS - EFFECT OF INCUBATION TEMPERATURE AND CHLORAMPHENICOL CONCENTRATION ON ISOLATION,
Connecticut Univ., Noank. Marine Research Lab.
For primary bibliographic entry see Field 5A.
W77-02525

FACTORS AFFECTING THE ADSORPTION OF POLIO VIRUS TO MAGNETITE IN WATER AND WASTEWATER,
Florida Univ., Gainesville. Dept. of Environmental Engineering Sciences.
G. Bitton, O. Pancorbo, and G. E. Gifford.
Water Research, Vol. 10, p 978-980, 1976. 5 fig, 7 tab, 22 ref. OWRT A-030-FLA(2). 14-31-0001-5009. 14-34-0001-6010.

Descriptors: *Viruses, *Filtration, Adsorption, *Waste water treatment.
Identifiers: *Magnetic filtration, *Polio virus, *Magnetite, *Virus removal.

The process of magnetic filtration involves the use of magnetite for the removal of various pollutants from water and wastewater. A study was undertaken to investigate the interaction between magnetite and polio virus. It was found that the adsorption process was enhanced by the presence of cations, conformed to the Freundich isotherm, and did not vary significantly when the pH was varied from 5 to 9. The influence of two wastewater effluents on the adsorption process was also studied and their interference with the adsorption of polio virus to magnetite is discussed. (Morgan-Florida)
W77-02530

USE OF WASTE HEAT FOR SOIL WARMING IN NORTH CAROLINA,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
R. W. Skaggs, D. C. Sanders, and C. R. Willey.
Reprint from Transactions of the ASAE, Vol. 19, No. 1, p. 159-167, 1976. OWRT A-060-NC(4). 14-31-0001-3833.

Descriptors: *Heat transfer, Surface irrigation, Subsurface irrigation, *Cooling water, *Heated water, Soil temperature, Southeast U.S., Horticultural crops, Electric power, Thermal pollution, *North Carolina.
Identifiers: *Soil warming, *Waste heat.

In field experiments conducted to evaluate the use of waste heat for soil warming in the Southeast, water was heated to 37.7C and circulated through a network of underground plastic pipes. Soil temperature and heat flux measurements were analyzed to determine the effect of soil warming in combination with surface and subsurface irrigation on the soil temperature regime and on the amount of heat that can be transferred to the soil system. It was determined that heat could be transferred to the soil system at rates ranging from 37.5 w/m2 during hot periods to greater than 138 w/m2 during cold periods. Soil warming increases surface temperatures sufficient to stimulate plant growth during cool seasons of the year. However, the temperature rise due to soil warming is somewhat less in hot periods. A mathematical model developed by Kendrick and Havens (1973) was used to extrapolate the information obtained in this study to prototype scale systems. It was determined from heat flux data that for hot summer days the effective surface temperature, approximately 6500 ha would be required to handle the waste heat from a 1000 megawatt plant if the soil warming system consists of 10 cm pipe buried 50 cm deep and placed 50 cm apart. If low volume sprinkler irrigation is used in combination with sub-surface irrigation, the effective surface temperature can be reduced to 27C and about 4900 ha would be required. Based on these projections and on an economic analysis of a soil warming system by Plummer (1974), it was concluded that soil warming systems will not be economically competitive with conventional cooling methods in N. C. at the present time. (Kiger-North Carolina)
W77-02532

SPRAY IRRIGATION OF WASTE WATER ON CITRUS GROVES,
Agricultural Research and Education Center, Lake Alfred, Fla.

WATER RESOURCES SCIENTIFIC INFORMATION CENTER U. S. DEPT. OF THE INTERIOR WASHINGTON, D. C. 20240

R. C. J. Koo.
Reprint from Transactions of the 1976 Citrus Engineering Conference, American Society of Mechanical Engineers, Florida Section, Vol XXII, March 25, 1976. 14 p, 5 fig, 6 tab, 10 ref. OWRT A-016-FLA(1). 14-31-0001-3809.

Descriptors: *Citrus, Irrigation, Nutrients, Water pollution, Fruit crops, *Spray irrigation, *Water reuse.

Spray irrigation is widely used to dispose of the waste water from citrus processing plants. The citrus processing season in Florida may range from 6 to 10 months a year depending on the size and the type of the fruit crop. Much of this season occurs in that part of the year when rainfall is deficient. It would be advantageous if this waste water could be utilized in the production of citrus crops. A study was conducted between 1971 and 1974 to investigate the feasibility of growing citrus with citrus processing waste water. Design criteria and operational methods of spray irrigation with citrus processing waste water under Florida conditions have been reported by Morrell. Tree performance and certain horticultural considerations of spray irrigation of citrus with processing waste water are investigated. (Morgan-Florida)
W77-02544

RISK-SAFETY FACTOR RELATION FOR STORM SEWER DESIGN,
Illinois Univ. at Urbana-Champaign. Dept. of Civil Engineering.
B. C. Yen, and W. H. Tang.
Journal of the Environmental Engineering Division, Proceedings of ASCE, Vol. 102, No. EE2, p 509-516, April, 1976. 3 fig, 1 tab, 9 ref, 2 append. OWRT C-4123(No. 9023) (7).

Descriptors: *Sewers, *Design criteria, *Risks, *Safety factors, *Storm drains, *Network design, *Pipes, Slopes, Equations, Rainfall intensity, Watersheds(Basins), Discharge(Water), Curves, Waste water treatment.
Identifiers: *Storm sewers, Pipe diameter, Sewer capacity.

A new method has been proposed for optimal design of diameters and slopes of pipes of storm sewer networks. The basic equations involved are introduced. The four parameters contributing to the uncertainty in the sewer capacity are evaluated. This uncertainty results from uncertainties in hydraulic radius, resistance coefficient, slope, and equation error. The uncertainty of rainfall intensity varies with the design return period and the duration of the rainfall and the location and size of the drainage basin. A 10-acre drainage basin at Urbana, Illinois is considered as an example. The uncertainties in runoff coefficient, area, and equation error must also be known to determine the uncertainty in design discharge. A risk-safety factor curve can be constructed by calculating corresponding risks and safety factors for various pipe sizes with other conditions unchanged, and repeating the procedure for a different duration. Different curves should be used for different locations, because spatial variations of rainfall and surface slope will cause the curves to vary. (Snyder-FIRL)
W77-02551

THE ROLE OF SOLAR ULTRAVIOLET RADIATION IN 'NATURAL' WATER PURIFICATION,
Kentucky Univ., Lexington. Dept. of Radiation Medicine.
J. Calkins, J. D. Buckles, and J. R. Moeller.
Photochemistry and Photobiology, Vol. 24, No. 1, p 49-57, July, 1976. 7 fig, 2 tab, 24 ref. OWRT A-064-KY(1).

Descriptors: *Water purification, *Coliforms, *Solar radiation, *Waste water treatment, *Tertiary treatment, Lagoons, Bacteria, Bactericides, Microorganisms, Mortality, Monitoring, E. coli.

The effect of solar ultraviolet radiation on natural water purification was investigated by monitoring the concentration of Escherichia coli in the input and output of a tertiary waste water system (four lagoons) over an 11-month period and by measuring the integrated flux of biologically active solar ultraviolet radiation. A comparison of the die-off expected from solar ultraviolet exposure to the actual die-off observed for different batches of water was obtained by also determining the effective temperature of the system, the growth rate of Escherichia coli at the effective temperature, the penetration of solar ultraviolet radiation into the lagoons, the dose-response relation for the killing of Escherichia coli by ultraviolet radiation, and the retention time of water in the system. The observed killing of Escherichia coli was quite close to the values calculated, and solar ultraviolet radiation appears to be a very important factor in the natural purification of water. (Kreager-FIRL)
W77-02552

ENVIRONMENTAL ASPECTS OF CHEMICAL USE IN PRINTING OPERATIONS, (SEPTEMBER 22-24, 1975, KING OF PRUSSIA, PA.), CONFERENCE PROCEEDINGS.
Environmental Protection Agency, Washington, D. C. Office of Toxic Substances
For primary bibliographic entry see Field 5C.
W77-02553

DEVELOPMENT DOCUMENT FOR EFFLUENT LIMITATIONS GUIDELINES AND NEW SOURCE PERFORMANCE STANDARDS FOR THE PLYWOOD, HARDBOARD AND WOOD PRESERVING SEGMENT OF THE TIMBER PRODUCTS PROCESSING POINT SOURCE CATEGORY,
Environmental Protection Agency, Washington, D. C. Effluent Guidelines Div.
For primary bibliographic entry see Field 5G.
W77-02554

HYPERFILTRATION FOR RENOVATION OF TEXTILE FINISHING PLANT WASTEWATER,
La France Industries, S. C.
C. A. Brandon, and J. J. Porter.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-251 188, Price codes: A08 in paper copy, A01 in microfiche. Report EPA-600/2-76-060, March 1976, 157 p, 15 fig, 8 ref, 23 tab, 3 append.

Descriptors: *Textiles, *Waste water treatment, *Water reuse, Wastes, Industrial wastes, Water pollution sources, Waste treatment, Dyes, Membrane processes, Costs, Water conservation, *Recycling, *Filtration, Waste water(Pollution), Water pollution treatment, Water pollution control.
Identifiers: *Hyperfiltration.

Experimental studies show that waste water from a textile dyeing and finishing operation can be recycled. The waste water was run through a set of hyperfiltration membranes, which separated it into purified water and a concentrated dye residue fraction. Over a 15-month period, up to 90% of the waste water was recovered and used as the normal supply in all parts of the dyeing operation. The concentrated dye residue can also be used to dye fabric. The cost of recycling the waste water was projected to be $0.121/cu m of waste water. However, reusing the waste water results in savings of $0.234/cu m, due to savings in water, chemicals, and energy. (Witt-IPC)
W77-02557

ORGANIC COMPOUNDS IN PULP MILL LAGOON DISCHARGE,
Washington Univ., Seattle. Coll. of Forest Resources.
For primary bibliographic entry see Field 5A.
W77-02558

CHLORIDES IN THE KRAFT RECOVERY SYSTEM. I. CHLORIDES IN THE RECOVERY BOILER, AND A MECHANISM FOR CHLORIDE REMOVAL,
Swedish Forest Products Research Lab., Stockholm.
B. Warnqvist, and H. Norrstrom.
TAPPI/CPPA International Pulp Bleaching Conference, Chicago, May 2-6, 1976, Preprinted Proceedings (TAPPI, Atlanta, Ga.), p 13-18. 10 fig, 9 ref.

Descriptors: *Bleaching wastes, *Water reuse, Pollution abatement, Pulp and paper industry, Water pollution sources, Wastes, Industrial wastes, Recycling, Water pollution control, Chlorides, Chemical reactions, Fly ash, Sodium chloride, Operation and maintenance, Water conservation, Effluents.
Identifiers: *Kraft mills, Recovery furnaces, Hydrogen chloride, Flue gases, Gas scrubbing.

One possible way to reduce the discharge of water pollutants from kraft pulp bleaching is to recycle effluent streams from the bleach plant to the recovery system. This raises questions concerning the effects of increased chloride levels in the liquor cycle and the removal of chloride from the recovery system. The distribution of chlorides between the smelt and the gas phase in the recovery furnace has been determined in mill trials and correlated with a theoretical chemical process model. The reaction equation given can be used to convert NaCl in the flue gas dust (fly ash) from the recovery furnace into gaseous HCl. The HCl produced can be removed by scrubbing the flue gas with water. Melting point data for chloride-containing smelts were determined by laboratory studies on the model system NACL-sodium carbonate-sodium sulfide. The implications of these studies on the operating conditions of the recovery furnace are discussed. (See also W77-02560) (Witt-IPC)
W77-02559

CHLORIDES IN THE KRAFT RECOVERY SYSTEM. II. PROCESS AND EQUIPMENT ASPECTS ON A CLOSED BLEACHED KRAFT MILL,
Finnish Pulp and Paper Research Inst., Helsinki.
P.-E. Ahlers, H. Norrstrom, and B. Warnqvist.
TAPPI/CPPA International Pulp Bleaching Conference, Chicago, May 2-6, 1976, Preprinted Proceedings (TAPPI, Atlanta, GA.), p 19-25. 9 fig, 29 ref, 3 tab.

Descriptors: *Bleaching wastes, *Water reuse, Wastes, Industrial wastes, Water pollution sources, *Recycling, *Chlorides, Corrosion, Steel, Alloys, Water pollution control, Closed systems, Effluents, Pulp and paper industry, Pollution abatement, Titanium, Oxygen.
Identifiers: *Kraft mills, Bleach plants, Delignification, Oxygen bleaching, Chlorine dioxide, Closed systems.

Recycling bleach plant effluent to the recovery system reduces the amount of water pollutants from a bleached kraft pulp mill. Several methods of removing chlorides from a mill with a closed bleachery are under development. Extended delignification in the cook, oxygen bleaching, and the use of a high proportion of chlorine dioxide during bleaching will help to keep chloride levels low. Chloride concentrations of 20-30 g NaCl/liter of white liquor have a slightly negative effect on pulp (this may be offset by increasing the sulfidity) but show no adverse effects on bleached pulp strength or brightness stability. Increases in recovery system corrosion are indicated. Only highly alloyed steels with a molybdenum content of more than 4% show fair stability in the first bleach stage; however, only titanium can be used with certainty in this corrosive environment. High-grade alloys must be used elsewhere in the bleach plant. (See also W77-02559) (Witt-IPC)
W77-02560

EFFLUENT-FREE BLEACHED KRAFT PULP MILL. VIII. BLEACH PLANT RENOVATION AND DESIGN,
Erco Envirotech Ltd., Toronto (Ontario).
D. W. Reeve, G. Rowlandson, and W. H. Rapson.
TAPPI/CPPA International Pulp Bleaching Conference, Chicago, May 2-6, 1976, Preprinted Proceedings (TAPPI, Atlanta, Ga.), p 117-125. 5 fig, 14 ref.

Descriptors: *Bleaching wastes, *Water reuse, Pollution abatement, Effluents, Wastes, Industrial wastes, Pulp wastes, Water pollution sources, *Recycling, *Design, Temperature, Chlorine, Water pollution control, Reclaimed water, Water conservation, Pulp and paper industry.
Identifiers: *Kraft mills, Bleach plants, Countercurrent washing, Pulp washing, Chlorine dioxide, Sodium hypochlorite.

Renovation programs in two existing kraft mills demonstrate that increased water reuse and recycle within conventional bleach plants can reduce steam and fresh water consumption and effluent volume. Recycle of the chlorination filtrate increases the temperature of the first stage, and with proper automatic control can result in substantial chemical savings with no loss in pulp strength or quality. Substantial steam savings result from implementation of complete countercurrent washing in both CEDED and CEHDED bleach plants. Several design features are recommended to prevent increased chemical consumption. The design for new kraft bleach plants incorporated not only chlorination filtrate recycle and complete countercurrent washing, but many other steam and water saving features. Fresh water addition to seal tanks, for pulp doctoring, and pump glands is minimized. All the oxidizing chemical required in the 70/30 D/C-EDED bleach plant, as chlorine dioxide, chlorine, and NaOCl, can be supplied by the chlorine dioxide generator, eliminating use of gaseous chlorine and minimizing water input. Seal tanks are specially designed to prevent foaming. Kraft bleach plants can be designed and operated so that only 4,000 U.S. gallons total filtrate is produced per ton of pulp. Filtrates from the first and second stages are used separately, in brown stock washing and in preparation of cooking liquor. All the bleach plant filtrate can be recovered and the last major source of water pollution from bleached kraft pulp mills eliminated. (See also W76-11382; W74-07379 and W74-05275) (Witt-IPC)
W77-02562

INVESTIGATIONS OF EFFLUENT CHARACTERISTICS FROM CONVENTIONAL AND OXYGEN BLEACHING SEQUENCES: RESULTS OF LABORATORY STUDIES,
National Council of the Pulp and Paper Industry for Air and Stream Improvement, Inc., Gainesville, Fla.
W. L. Carpenter, W. T. McKean, H. F. Berger, and I. Gellman.
TAPPI/CPPA International Pulp Bleaching Conference, Chicago, May 2-6, 1976, Preprinted Proceedings (TAPPI, Atlanta, Ga.), p 111-115. 18 ref, 5 tab.

Descriptors: *Bleaching wastes, Effluents, Wastes, Industrial wastes, Water pollution sources, Softwood, Hardwood, Color, Biochemical oxygen demand, Chemical oxygen demand, Chlorides, *Waste water treatment, Water pollution treatment, Aeration, Oxidation lagoons, Waste treatment, Pulp and paper industry, Pollution abatement.
Identifiers: *Oxygen bleaching, Kraft pulps, Sulfite pulps.

Effluents from the laboratory bleaching of kraft softwood, hardwood, and sulfite pulps by conventional sequences (CEHDED and CEH) and by oxygen sequences (OCEDED, OCED, COD, CODED, and D/COD) are compared. The reductions in color, BOD, chemical oxygen demand, chloride, and total, volatile, and fixed solids were 99, 39, 89, 51, 74, 60, and 87%, respectively, on switching from CEH to OC sequences. Reductions were 60, 50, 33, 62, 0, 24, and 0%, respectively, using a CO sequence. Information on laboratory bleaching conditions employed is detailed, including temperature, time, pulp consistency, chemical charge, oxygen pressure, and volume of wash water. Data on final pulp brightness and kappa-number are presented. Laboratory studies on treatment of the effluents in an aerated stabilization basin are described, showing reductions in BOD of 90% with 4 days aeration. (Witt-IPC)
W77-02563

NEW BIOLOGICAL CLARIFIER OF THE WIESLOCH PAPER MILL OF HOLFELDER-WERKE GMBH. UND CO. KG. (NEUE BIOLOGISCHE KLAERANLAGE DER PAPIER-FABRIK WIESLOCH DER HOLFELDER-WERKE GMBH UND CO. KG.),
H. L. Dalpke.
Wochenblatt fuer Papierfabrikation, Vol. 104, No. 18, p 701, 703, September 30, 1976. 2 illus.

Descriptors: *Pulp wastes, *Waste water treatment, *Biological treatment, Wastes, Waste treatment, Industrial wastes, Water pollution treatment, Water pollution sources, Biochemical oxygen demand, Chemical oxygen demand, Foreign countries, Europe.
Identifiers: Germany.

A brief description is given of a new biological clarifier installation, using the two-stage Attisholz process. BOD was reduced from 1200 mg to 10 mg oxygen/liter. Corresponding values for COD were 1800 and 100, respectively. (Ward-IPC)
W77-02566

NEW CLARIFIER INSTALLATION FOR ALBBRUCK PAPER MILL (NEUE KLAERANLAGE DER PAPIERFABRIK ALBBRUCK).
Wochenblatt fuer Papierfabrikation, Vol. 104, No. 17, p 663, 665, September 15, 1976. 5 fig, 1 tab.

Descriptors: *Pulp wastes, *Waste water treatment, *Treatment facilities, Wastes, Industrial wastes, Waste treatment, Water pollution treatment, Water pollution control, Water pollution sources, Neutralization, Flocculation, Sludge treatment, Dewatering, Sludge disposal, Pulp and paper industry, Europe.
Identifiers: Rhine River(Germany), White water(Paper machines), Germany.

The mill's new effluent treatment system (for white water from 5 fine-paper machines and one coating machine) is briefly described. The system includes neutralization, sludge-contact-flocculation, sludge-thickening, and sludge-dewatering stages. The clarified water has a maximum solids content of 20 g/liter and is discharged into the Rhine River. The dewatered sludge is suitable for dumping. (Speckhard-IPC)
W77-02567

ENVIRONMENTAL PROTECTION IN THE PULP AND PAPER INDUSTRY, POSSIBILITIES OF REALIZATION AND PRESENT STATE OF TECHNOLOGY (UMWELTSCHUTZ IN DER ZELLSTOFF- UND PAPIERINDUSTRIE, MOEGLICHKEITEN DER REALISIERUNG UND HEUTIGER STAND DER TECHNIK),
Cellulose Attisholz A. G. (Switzerland).
A. Scherler.
Wochenblatt fuer Papierfabrikation, Vol. 104, No. 17, p 613-618, 620, September 15, 1976. 4 fig, 12 tab.

Descriptors: *Pulp wastes, *Waste water treatment, Treatment facilities, Effluents, Pulp and paper industry, *Biological treatment, *Activated carbon, Water pollution sources, Water pollution treatment, Wastes, Industrial wastes, Carbon, Organic compounds, Pollution abatement.

Topics discussed are the composition of effluents, the special problems of pulp mill waste waters and the consequences for the pulp industry, differences between pulp and paper mill treatments of wastes, special problems of paper mill waste waters and consequences for the paper industry, and some experimental results on effluents from 10 paper mills and 4 board mills. The effluent testing involved biological clarification and activated carbon treatment of the clarified effluent and resulted in total organic carbon (TOC) reductions ranging from 89.6 to 97.9%. (Ward-IPC)
W77-02568

MODERN SEPARATION PROCESSES FOR ELIMINATING WASTE WATER AND SLUDGE PROBLEMS IN PULP AND PAPER MILLS (NEUZEITLICHE TRENNUNGSVERFAHREN ZUR BESEITIGUNG DES ABWASSER UND SCHLAMMPROBLEMES IN ZELLSTOFF- UND PAPIERFABRIKEN),
VIBCONSULT, Munich (Germany).
J. Bauer.
Wochenblatt fuer Papierfabrikation, Vol. 104, No. 17, p 632-635, 638-640, September 15, 1976. 9 fig, 2 illus, 10 ref, 4 tab.

Descriptors: *Pulp wastes, *Waste water treatment, *Reverse osmosis, *Sludge treatment, *Aeration, Wastes, Industrial wastes, Water pollution treatment, Water pollution sources, Dewatering, Sludge, Membrane processes, Oxygenation, Waste treatment, Separation techniques.

The reverse osmosis process for effluent treatment and the Unox system for oxygen-activation of biological sludges are described. Various types of processes for dewatering primary and secondary sludges and mixtures are also compared. (Ward-IPC)
W77-02569

TREATMENT OF PAPERMAKING EFFLUENTS (TRAITEMENT D'EFFLUENTS DE PAPETERIES),
Pulp and Paper Research Inst. of Canada, Pointe Claire (Quebec).
A. Wong, S. Prahacs, and J. Dorica.
French Patent No. 2,252,301, June 20, 1975. 16 p. 2 claims.

Descriptors: *Pulp wastes, *Waste water treatment, *Activated carbon, *Patents, Wastes, Industrial wastes, Water pollution treatment, Water pollution control, Waste treatment, Coagulation, Flocculating, Sludge, Flotation, Centrifugation, Fly ash, Coals, Aeration.
Identifiers: Charcoal, Wood.

A process for purifying waste waters such as papermaking effluents involves the following operations: finely divided activated carbon is added to the waste water to form a suspension, an oxygen-containing gas (e.g., air) is passed through the suspension, a coagulating or flocculating agent or polyelectrolyte is added to form a sludge, and the sludge is separated by decantation, flotation, or centrifugation. In particular, the finely divided activated carbon has a specific surface of 100-1800 sq m/g and is derived from fly ash, wood carbonization residue, green liquor mud, wood charcoal, and/or bone coal. (Speckhard-IPC)
W77-02570

FIXED BIOLOGICAL SURFACES -- WASTE-WATER TREATMENT: THE ROTATING BIOLOGICAL CONTRACTOR,
Autotrol Corp., Milwaukee, Wis.
R. L. Antonie.
CRC Press, Cleveland, Ohio. 1976. 200 p.

Descriptors: *Biological treatment, *Waste water treatment, *Pulp wastes, Wastes, Industrial wastes, Waste treatment, Treatment facilities, Suspended solids, History, Trickling filters,

U. OF I. URBANA-CHAMPAIGN

Capital costs, Operating costs, Cost, Operation and maintenance, Sampling, Water analysis, Municipal wastes, Equipment, Water purification, Water pollution treatment.
Identifiers: *Rotating biological contactor.

The RBC process for secondary biological treatment of domestic waste waters and industrial effluents involves the use of large-diameter plastic media mounted on a horizontal shaft which rotates slowly in a concrete tank while about 40% of its surface area is submerged. The resulting accumulation of biomass in layers 1-4 mm thick, equivalent to 50,000-100,000 mg/liter suspended solids, permits intensive purification within fairly short retention times. This monograph deals with the history and development of the RBC process, the basic design and operating parameters of the contactor, and practical experience with its operation. In 10 chapters, the author discusses a wealth of details, such as the early trickling filter (fundamentals, history, problems, capital and operating costs); RBC system designs for domestic wastewater treatment and for treating various industrial wastes (such as pulp and paper mill discharges); the upgrading of existing treatment facilities (primary, trickling-filter, activated-sludge, and lagoon installations); equipment configurations and plant operation (startup, problem areas, maintenance, wastewater sampling and analysis); capital and operating costs (power consumption, comparison with activated sludge and other secondary treatment processes); and possible future developments. A subject index is appended, and literature citations are given after each chapter. (Brown-IPC)
W77-02571

C(ROWN) Z(ELLERBACH)'S SOLIDS WASTE PROBLEMS AT WAUNA ARE REDUCED BY COMPOSTING,
Crown Zellerbach Corp., Wauna, Oreg.
For primary bibliographic entry see Field 5E.
W77-02572

CARPET AND RUG INDUSTRY CASE STUDY I: WATER AND WASTEWATER TREATMENT PLANT OPERATION,
Georgia State Univ., Atlanta.
P. E. Gaffney.
Journal Water Pollution Control Federation, Vol. 48, No. 11, p 2590-2598, November, 1976. 7 ref, 7 tab.

Descriptors: *Textiles, *Water pollution sources, *Water treatment, *Waste water treatment, Georgia, Biochemical oxygen demand, Chemical oxygen demand, Suspended solids, Operation and maintenance, Wastes, Industrial wastes, Treatment facilities, Polychlorinated biphenyls, Organic compounds.
Identifiers: Carpets, Rugs, Coosa River(Georgia), Chlorobenzenes, Halocarbons.

An investigation was conducted on water supplies and municipal waste waters in three northwest Georgia cities situated in the Coosa River basin. Streams and sewers receive significant discharges of textile (carpet and rug) processing chemicals. Determination was made of the concentrations of biphenyl, chlorobiphenyl, chlorobenzenes, and other substances at three water and four waste water treatment facilities in conjunction with other data (BOD, COD, suspended solids) relating to plant operation and performance. Two waste treatment plants were experiencing operating difficulties which may be related to the presence of textile-processing chemicals or substances formed after chlorination such as chlorobiphenyls or polychlorinated biphenyls. (Witt-IPC)
W77-02574

STUDY OF DEWATERING OF CELLULOSIC SLUDGE FROM THE VISCOSE FIBER INDUSTRY (ISSLEDOVANIE PO OBEZVOZHIVANIYU TSELLYULOZNOGO SHLAMA PREDPRIYATII VISKOZNOGO VOLOKNA),
Lvovskii Politekhnicheskii Institut (USSR).
A. A. Berlin, and E. I. Kuryatnikov.
Khimicheskaya Tekhnologiya, Vol. 87, No.3, p 47-48, May/June, 1976. 2 fig, 4 ref, 1 tab.

Descriptors: *Sludge disposal, *Dewatering, *Pulp wastes, *Cellulose, Filtration, Polymers, Aluminum, Sulfates, Water pollution sources, Wastes, Industrial wastes, Drainage, Waste disposal, Mixing, Sludge, Solid wastes, Water pollution control, Textiles.
Identifiers: *Viscose, Waste paper, Paper machines, Polyacrylamide, Polyethylene oxide.

After a discussion of the disadvantages of known methods (notably sludge accumulators, drainage beds, or centrifugation) for dewatering and disposal of sludges produced in the maufacture of viscose, the authors report results of experiments designed for dewatering blends of waste paper pulp plus cellulosic sludge by filtration on a paperboard machine at various degrees of freeness. Optimum freeness for the blend was determined to be between 25 and 40 Schopper-Riegler. The influence of drainage aids, viz., polyacrylamide (PAA), aluminum sulfate, and polyethylene oxide (PEO) on the freeness degree was also evaluated, with the following results: addition of 1.5% aluminum sulfate or 0.05% PAA (dry-weight basis) assures the effective lowering of the beating degree. However, the addition of 0.3-0.8% PEO (dry-weight basis) produced the best results and lowered the beating degree to a greater extent than did the other two coagulants added in optimal concentrations. Based on these findings, it is suggested that dehydration of a blend of waste paper pulp and cellulosic sludge obtained from the production of viscose can be carried out effectively on industrial board machines, provided the optimum ratio of components is maintained, preferably 3 parts waste paper pulp per part of cellulosic sludge. (Sykes-IPC)
W77-02575

5E. Ultimate Disposal Of Wastes

THE DESIGN AND CONSTRUCTION OF A SCREENING AND PUMPING STATION AND AN OUTFALL FOR THE DISPOSAL OF SEWAGE FROM BRIGHTON AND HOVE,
J. D. C. Osorio.
The Public Health Engineer, Vol 4, No 5, p 131-137, September, 1976. 4 fig, 6 ref.

Descriptors: *Pumping plants, *Screens, *Outlets, *Sewage disposal, *Treatment facilities, Equipment, Construction, Design criteria, Liquid wastes, Suspended solids, Waste water treatment, Waste disposal, Flow, Hydraulics, Municipal wastes.

Design and construction details of a screening and pumping station and an outfall for the disposal of sewage from Brighton and Hove (Great Britain) are described. The general scheme involves: an outfall long enough to ensure that sewage cannot reach the beach areas of the above communities until dilution and action of the sea water on sewage bacteria have reduced pollution to an acceptable level, pumps to allow the intercepting sewer to discharge freely at all times, and screens and ancillary equipment for the removal of sewage solids. The pumping and screening plant is designed for a 4000-liters/sec flow, and the outfall and diffuser system is designed to accept 6800 liters/sec, six times the anticipated average dry-weather flow. The screening plant should be capable of handling 2500 kg of dry solids/day. Screenings are removed from the fine screens by water jets, and grit removal from tanks is by chain and bucket scrapers. The outfall tunnel is 2.3 meters in internal diameter and 1830 meters long and is lined with Kinnear Moodie Rapid smooth bore segments. infiltration of groundwater is controlled by injecting rapid hardening cement grout through holes drilled ahead of the face. (Kreager-FIRL)
W77-02331

DILUTION AND DESIGN,
Water Pollution Research Lab., Stevenage (England).
A. R. Agg.
Water and Waste Treatment, Vol 19, No 7, p 33, July, 1976. 2 fig, 1 ref.

Descriptors: *Outlets, *Design criteria, *Waste water disposal, *Conveyance structures, *Hydraulic structures, Mathematical models, Sewage disposal, Industrial wastes, Liquid wastes, Waste disposal.

A method for designing outfalls for the discharge of sewage or industrial wastes to the sea is described which is based primarily on initial dilution and the transit times from the outfall to the area of concern. The design procedure assumes a demand for very high initial dilution factors if the release is close to the beach and progressively lower demand factors as the outfall is extended offshore. The design length for the outfall is given by the intersection of a curve for the dilution which can be attained with the flow of sewage and depths of water with a curve representing the demand for dilution. Calculations based on the above design procedure indicate that a system with 10 outfalls reduces the length of the outfall required by about 50%. (Kreager-FIRL)
W77-02332

SPRAY IRRIGATION SOLVES DISPOSAL PROBLEM,
Van Note-Harvey Associates, Princeton, N.J.
For primary bibliographic entry see Field 5D.
W77-02356

RECOVERY AND REUSE OF ALUM FROM WATER FILTRATION PLANT SLUDGE BY ULTRAFILTRATION,
Massachusetts Univ., Amherst. Environmental Engineering.
For primary bibliographic entry see Field 5D.
W77-02371

SOYBEAN YIELD RESPONSES AND ASSIMILATION OF ZN AND CD FROM SEWAGE SLUDGE-AMENDED SOIL,
Illinois Univ. at Urbana-Champaign. Dept. of Agronomy.
For primary bibliographic entry see Field 5C.
W77-02377

MOVEMENT OF HEAVY METALS BELOW SEWAGE DISPOSAL PONDS,
California Univ., Riverside. Dept. of Soil Science and Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W77-02379

THE INFLUENCE OF HIGH QUANTITIES OF MANURE ON SOIL WATER, AND PLANTS, (IN GERMAN),
Agricultural Experiment Station, Oldenburg (West Germany).
For primary bibliographic entry see Field 5G.
W77-02387

CROP RESPONSE TO TANK TRUCK APPLICATION OF LIQUID SLUDGE,
Ball State Univ., Muncie, Ind. Dept. of Natural Resources.
For primary bibliographic entry see Field 5C.
W77-02390

ENVIRONMENTAL IMPACTS OF LAND APPLICATION OF SLUDGE,
Metropolitan Sanitary District of Greater Chicago, Ill. Dept. of Research and Development.
For primary bibliographic entry see Field 5D.
W77-02391

OCEAN DUMPING PHASE-OUT IN EPA REGION II,
S. J. Hadeed.
Journal Water Pollution Control Federation, Vol. 48, No. 10, p 2246-2248, October, 1976.

Descriptors: *Sewage sludge, *Sludge disposal, *Oceans, *Legislation, *Coasts, Legal aspects, Monitoring, Cities, Waste disposal, New York, New Jersey.
Identifiers: Land application, Composting, Pyrolysis.

Environmental Protection Agency plans for phasing out ocean dumping of sewage sludge in Region II are described. Provisions to end ocean dumping by December 31, 1981 will be written into the interim dumping permits which will also prohibit nighttime dumping and recommend an expanded monitoring program. A comprehensive study of land-based alternatives to ocean dumping in Region II contracted by the Environmental Protection Agency indicates that air pollution rules must be waived in the New York and New Jersey metropolitan areas and recommends that regional pyrolysis facilities be constructed in the New York-New Jersey area. Land application or composting is recommended for sludge produced in outlying areas. Senate bill S 3147 which extends the Marine Protection, Research and Sanctuaries Act through fiscal 1977 appropriates $4.8 million for ocean dumping regulation, $5.6 million for ocean dumping research, and $0.5 million for marine sanctuaries. It also requires that the Secretary of the Army, Coast Guard, and Administrator of the Environmental Protection Agency submit annual reports on their respective activities in carrying out the ocean dumping title of the Act. (Kreager-FIRL)
W77-02393

GAS AND LEACHATE FROM LANDFILLS: FORMATION, COLLECTION, AND TREATMENT. PROCEEDINGS OF A RESEARCH SYMPOSIUM.
Municipal Environmental Research Lab., Cincinnati, Ohio.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-251 161, Price codes: A09 in paper copy, A01 in microfice, Report EPA-600/9-76-004, Edited by E. J. Genetelli and J. Cirello. Held at New Brunswick, N. J., March 25-26, 1975, Published March 1976. 196 p. 104 fig, 47 tab, 102 ref.

Descriptors: *Landfills, *Leachate, *Gases, *Waste disposal, *Solid wastes, Soil types, Migration, Attenuation, Monitoring, Analytical techniques, Research priorities, Toxicity, Hazards, Liners, Recycling, Sludge, Clay minerals, Soil mechanics, Groundwater, Water pollution, Organic compounds.

Topics dealing with the formation, collection, and treatment of gas and leachate from landfills are presented. Specific subjects discussed include: current Environmental Protection Agency activities in solid waste management research; solid waste management research in New York State, Puerto Rico, and the United Kingdom; a theoretical analysis of gas movement through soils; analytical methodologies for leachate and gas analysis; leachate attenuation in undisturbed and remoulded soils; variations in gas and leachate production from baled and non-baled municipal refuse; gas and leachate generation in various solid waste environments; leachate migration through selected clays; the pollution of groundwater by organic compounds generated by landfill activities; attenuation mechanisms of pollutants through soils; the monitoring of toxic chemicals at land disposal sites; an assessment of synthetic and admixed materials for lining landfills; landfill management with leachate recycle and treatment; the effect of shredding and sludge addition on solid waste decomposition; and a case history of landfill gas movement through soils. (See also W77-02395 thru W77-02413) (Kreager-FIRL)
W77-02394

INTRODUCTION TO SYMPOSIUM ON GAS AND LEACHATE FROM LANDFILLS: FORMATION, COLLECTION, AND TREATMENT,
Rutgers - The State Univ., New Brunswick, Dept. of Environmental Science.
A. J. Kaplovsky.
In: Symposium on Gas and Leachate from Landfills: Formation, Collection, and Treatment, March 25-26, 1975, New Brunswick, New Jersey, Department of Environmental Science, Rutgers University, p 1-2.

Descriptors: *Landfills, *Waste disposal, *Leachate, *Soil types, *Soilid wastes, Environmental effects, Environmental sanitation.

Problems associated with assessing the impact of solid waste disposal in landfills are discussed, with particular emphasis on the importance of considering all of the environmental interactions involved. Constituent concentrations of pollutants found during landfill investigations should be carefully qualified by reporting fully the environmental conditions under which the decomposition occurred. For example, simply reporting the constitutent level at a given distance from the source without including the type of soil or medium through which the leachate traveled, the time of transit, or vegetative cover can lead to a misrepresentation of the findings. At the current pace of new legislation and enforcement, it is especially important to appropriately identify findings and to delineate limitations on conclusions. (See also W77-02394) (Kreager-FIRL)
W77-02395

CURRENT EPA RESEARCH ACTIVITIES IN SOLID WASTE MANAGEMENT,
National Environmental Research Center, Cincinnati, Ohio.
N. B. Schomaker, and M. H. Roulier.
In: Symposium on Gas and Leachatfrom Landfills: Formation, Collection, and Treatment, March 25-26, 1975, New Brunswick, New Jersey, Department of Environmental Science, Rutgers University, p 3-11. 1 tab.

Descriptors: *Waste disposal, *Solid wastes, *Reclamation, *Research priorities, *Federal government, Programs, Energy conversion, Land use, Recycling, Regulation.

Environmental Protection Agency research activities dealing with the management and disposal of solid wastes are outlined. The Agency's research efforts in this area include: establishing the basis for a solid waste management regulatory program for hazardous and nonhazardous wastes; determining the human health and environmental effects resulting from the land disposal of selected substances; investigating the migration of hazardous materials through soils and in water transport; establishing the role of soil in controlling or reducing harmful substances reaching water or air; assessing technology for the control of hazardous solid wastes; and evaluating the potential of source reduction, recycling, and energy conversion of solid waste materials. (See also W77-02394) (Kreager-FIRL)
W77-02396

CURRENT OFFICE OF SOLID WASTE MANAGEMENT PROGRAMS - LANDFILL ACTIVITIES,
Environmental Protection Agency, Washington, D.C. Office of Solid Waste Management Programs.
T. V. DeGeare, Jr.
In: Symposium on Gas and Leachate from Landfills: Formation, Collection, and Treatment, March 25-26, 1975, New Brunswick, New Jersey, Department of Environmental Science, Rutgers University, p 12-15.

Descriptors: *Landfills, *Waste disposal, *Research priorities, *Leachate, *Gases, Federal government, Programs, Waste treatment, Solid wastes, Monitoring, On-site investigations, Toxicity, Economics, Groundwater, Soil tests, Soil mechanics, Filtration, Irrigation, Activated sludge.

Research programs currently being conducted by the Environmental Protection Agency's Office of Solid Waste Management which deal with problems related to leachate and gas generation during landfill activities are outlined. These programs include: field monitoring activities to learn about leachate generation and movement under various field conditions; an assessment of the economic impact resulting from the effect of poor waste disposal practices on ground water contamination; studies on the extent to which soil attenuation acts as a mechanism for reducing the harmful effects of leachate; an evaluation of various leachate treatment methods (anaerobic filtration, spray irrigation, activated sludge treatment); and studies on the nature of landfill-generated gas both in terms of its potential as a hazard and as an energy source. (See also W77-02394) (Kreager-FIRL)
W77-02397

CURRENT SOLID WASTE RESEARCH ACTIVITIES IN NEW YORK STATE,
New York State Dept. of Environmental Conservation, N. Y. Div. of Solid Waste Management.
C. N. Goddard.
In: Symposium on Gas and Leachate from Landfills: Formation, Collection, and Treatment, March 25-26, 1975, New Brunswick, New Jersey, Department of Environmental Science, Rutgers University, p 16-17.

Descriptors: *Landfills, *Leachate, *Research priorities, *Waste disposal, *Solid wastes, Monitoring, Streams, Springs, Surface waters, Flow, Analytical techniques, Water pollution, Pollutant identification, *New York, Programs.

Solid waste research being sponsored by the State of New York is described. Leachate from two landfills in the central part of the state is being extensively sampled at a series of surface sample points in springs and streams below the disposal sites to learn more about the conservative nature of various pollutants. Flow measurements are being performed in the streams to provide information on the influence of dilution. This information will then be used to select a set of leachate indices. Another project funded by the Environmental Protection Agency is being conducted concurrently with the above research to investigate various ways of detecting the presence of leachate during the daytime and at night. Various types of films and thermal scanners are being evaluated. (See also W77-02394) (Kreager-FIRL)
W77-02398

CURRENT SOLID WASTE MANAGEMENT ACTIVITIES IN PUERTO RICO,
Puerto Rico Environmental Quality board, San Juan.
S. Robena, Jr.
In: Symposium on Gas and Leachate from Landfills: Formation, Collection, and Treatment, March 25-26, 1975, New Brunswick, New Jersey,

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Department of Environmental Science, Rutgers University, p 18-25. 1 fig, 2 tab, 8 ref.

Descriptors: *Solid wastes, *Waste disposal, *Landfills, *Leachate, *Research priorities, *Energy conversion, Monitoring, Pollutant identification, Reclamation, Economics, Feasibility studies, Physical properties, Chemical properties, Surveys, Information exchange, Groundwater, Toxicity, *Puerto Rico.

Research activities on solid waste management in Puerto Rico are reviewed. Studies on leachate formation at different sanitary landfill sites have been initiated in coordination with the United States Geological Survey. A long-range plan for a continuous monitoring program at solid waste disposal sites has been proposed to assess the quality of groundwater near landfill sites. Advanced resource recovery studies are being conducted to investigate the feasibility of using metropolitan solid waste as an auxiliary fuel and to evaluate existing markets for segregated solid wastes, paper, glass, and metals. Community information programs are also being conducted. An island-wide survey of industrial hazardous and toxic wastes is being performed so that a state plan for the management of these wastes can be formulated. Detailed physical and chemical data from an analysis of leachate sampled at one of the landfill sites investigated are tabulated. (See also W77-02394) (Kreager-FIRL)
W77-02399

LANDFILL RESEARCH WORK IN PROGRESS AT HARWELLS HAZARDOUS MATERIALS SERVICE,
Atomic Energy Research Establishment, Harwell (England).
J. Bromley.
In: Symposium on Gas and Leachate from Landfills: Formation, Collection, and Treatment, March 25-26, 1975, New Brunswick, New Jersey, Department of Environmental Science, Rutgers University, p 27-32.

Descriptors: *Solid wastes, *Waste disposal, *Leachate, *Landfills, *Research priorities, Reclamation, On-site investigations, Leaching, Movement, Rock properties, Chemical wastes, Toxicity.
Identifiers: *United Kingdom.

Research on solid waste management in the United Kingdom is reviewed, with particular emphasis on landfill site studies. The research activities include: the reclamation of landfill sites; the development of a data bank on potentially hazardous materials deposited into landfills; on-site investigations of different types of landfills; supporting lysimeter programs; studies on the behavior of selected toxic wastes associated with landfill leachate; studies of the movement of toxic leachate through sandstone, chalk, and gravel; experiments involving the exposure of different rock cores to synthetic leachate mixtures; studies on the relative rates at which various toxic materials are leached from actual wastes; and evaluations of encapsulation procedures for preventing the release of toxic wastes to landfills under different conditions. (See also W77-02394) (Kreager-FIRL)
W77-02400

THEORETICAL APPROACH TO GAS MOVEMENT THROUGH SOILS,
Ohio State Univ., Columbus. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W77-02401

ANALYTICAL METHODOLOGIES FOR LEACHATE AND GAS ANALYSIS,
Illinois Univ. at Urbana-Champaign. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5A.
W77-02402

LEACHATE ATTENUATION IN UNDISTURBED AND REMOULDED SOILS,
Waterloo Univ. (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W77-02403

VARIATIONS IN GAS AND LEACHATE PRODUCTION FROM BALED AND NON-BALED MUNICIPAL REFUSE,
Systems Technology Corp., Dayton, Ohio.
M. C. Eifert.
In: Symposium on Gas and Leachate from Landfills: Formation, Collection, and Treatment, March 25-26, 1975, New Brunswick, New Jersey, Department of Environmental Science, Rutgers University, p 71-82. 10 fig, 3 tab.

Descriptors: *Leachate, *Gases, *Landfills, *Municipal wastes, *Waste disposal, Color, Conductivity, Chemical oxygen demand, Hardness(Water), Carbon, Iron, Copper, Zinc, Nickel, Chemical analysis, Solid wastes, *Pollutant identification.

Experiments involving the use of five landfill simulators filled with municipal refuse were performed to investigate gas and leachate production. Although insufficient gas was generated for analysis, leachate was collected several times. The first leachate collected appeared to be the squeezings from the solid waste during loading. Further leachates gathered reflected leachate generated from moisture additions. The experiments are still underway, and no conclusions can be drawn because of the limited amount of data thus far generated. Leachate analytical data for color, pH, conductivity, chemical oxygen demand, hardness, total organic carbon, volume, iron, copper, zinc, and nickel are tabulated. (See also W77-02394) (Kreager-FIRL)
W77-02404

GAS AND LEACHATE GENERATION IN VARIOUS SOLID WASTE ENVIRONMENTS,
Systems Technology Corp., Dayton, Ohio.
A. G. Jackson, and D. R. Streng
In: Symposium on Gas and Leachate from Landfills: Formation, Collection, and Treatment, March 25-26, 1975, New Brunswick, New Jersey, Department of Environmental Science, Rutgers University, p 83-091. 2 fig, 5 tab.

Descriptors: *Landfills, *Leachate, *Gases, *Chemical analysis, *Microbiology, Waste disposal, Coliforms, Streptococcus, Methane, Chemical properties, Solid wastes, Simulation analysis, *Pollutant identification.

Ongoing experiments to investigate gas and leachate generation in different solid waste environments are reported. Landfill simulations with test cells containing solid waste and selected other wastes have been in progress for about 4 months. The cells are in the early stages of methane generation and have just completed the change from aerobic to anaerobic condition. Microbiological assay of the leachate revealed high levels (generally 100,000 colonies/100 milliliters) of fecal coliforms and fecal streptococcus in the initial leachate collected. Analysis of the leachates that followed revealed an increasing dieoff of coliforms in the leachate as the cell aged. Streptococcus remained quite high for several months but is now beginning to decrease. Detailed chemical data for the leachate and gas collected thus far are tabulated. (See also W77-02394) (Kreager-FIRL)
W77-02405

LEACHATE MIGRATION THROUGH SELECTED CLAYS,
Illinois State Geological Society, Urbana.
For primary bibliographic entry see Field 5B.
W77-02406

ORGANIC POLLUTANTS CONTRIBUTED TO GROUNDWATER BY A LANDFILL,
Robert S. Kerr Environmental Research Lab., Ada, Okla.
For primary bibliographic entry see Field 5B.
W77-02407

ATTENUATION MECHANISMS OF POLLUTANTS THROUGH SOILS,
Arizona Univ., Tucson. Coll. of Agriculture.
For primary bibliographic entry see Field 5B.
W77-02408

MONITORING TOXIC CHEMICALS IN LAND DISPOSAL SITES,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 5A.
W77-02409

ASSESSING SYNTHETIC AND ADMIXED MATERIALS FOR LINING LANDFILLS,
Matrecon, Inc., Oakland, Calif.
H. E. Haxo, Jr.
In: Symposium on Gas and Leachate from Landfills: Formation, Collection, and Treatment, March 25-26, 1975, New Brunswick, New Jersey, Department of Environmental Science, Rutgers University, p 130-158. 8 fig, 14 tab, 26 ref.

Descriptors: *Linings, *Landfills, *Leachate, *Waste disposal, *Simulation analysis, Materials, Polymers, Asphalt, Soils, Physical properties, Performance, Evaluation.

Experiments involving the use of various polymeric and admixed materials for landfill liners are reported. The liners are mounted as barriers in the bases of 24 simulated sanitary landfills which are uniformly filled with a shredded municipal refuse with a moisture content of 30%. In addition, 42 small membrane specimens are being exposed to leachate by being placed in the sand above the barriers. To date, only a soil-asphalt liner appears to be inadequate. Leachate is seeping through one specimen of this type, and indications are that a second liner of this type will also leak. Sealing the liners into the generator bases with a cast epoxy ring has worked out satisfactorily except for the soil-asphalt liner. Polyethylene film appears to be sensitive to creasing and puncturing, although it has not failed as a barrier. Laboratory tests of unexposed membrane liners of the same polymer indicate that there can be considerable liner-to-liner variation in liners of the same polymer type. These variations probably reflect differences in compounding and in fabrication of the liner materials. (See also W77-02394) (Kreager-FIRL)
W77-02410

LANDFILL MANAGEMENT WITH LEACHATE RECYCLE AND TREATMENT: AN OVERVIEW,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
For primary bibliographic entry see Field 5D.
W77-02411

SOLID WASTE DEGRADATION DUE TO SHREDDING AND SLUDGE ADDITION,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
R. K. Ham.
In: Symposium on Gas and Leachate from Landfills: Formation, Collection, and Treatment, March 25-26, 1975, New Brunswick, New Jersey, Department of Environmental Science, Rutgers University, p 168-176. 6 fig, 1 tab, 5 ref.

Descriptors: *Landfills, *Solid wastes, *Sludge, *Waste disposal, *Waste treatment, Leachate, Methane, Biological treatment, Chemical reactions, Evaluation, Performance, Odor.

Experiments investigating the effects of shredding and sludge addition on refuse decomposition in landfills are reported. The shredding of refuse promoted decomposition, resulting in rapid oxygen use and methane production as well as stabilization of leachate contaminant production. Cover prolonged the period of acidic leachate production and postponed methane production. The addition of sludge to shredded refuse resulted in odors, and a 70% water mixture was not workable. Flies were attracted to the refuse-sludge cells, whereas no flies were observed in cells without sludge. Rodent activity developed on noncompacted cells but was not observed on the compacted cells. The production of leachate per ton of dry refuse increased markedly with initial percent water and was not a strong function of compaction or depth. It appears that environmental and operational problems associated with the incorporation of sludge with refuse may negate any advantages of the process. (See also W77-02394) (Kreager-FIRL)
W77-02412

CASE HISTORY OF LANDFILL GAS MOVEMENT THROUGH SOILS,
Cook Coll., New Brnswick, N. J.
F. B. Flower.
In: Symposium on Gas and Leachate from Landfills: Formation, Collection, and Treatment, March 25-26, 1975, New Brunswick, New Jersey, Department of Environmental Science, Rutgers University, p 177-189. 14 fig.

Descriptors: *Landfills, *Waste disposal, *Gases, Migration, *Phytotoxicity, Vegetation, Hazards, Solid wastes, On-site investigations, *Path of pollutants.

Three cases of landfill gas migration problems are reviewed. Each case involved the disposal of commercial refuse in old sand and gravel pits. Problems resulting from the migration of gas generated from the landfills included the death of peach trees, the death of ornamental vegetation, and the demise of commercial farm crops. One case also involved the entrance of combustible gases into private residences adjacent the landfill. The studies demonstrated that injury and death of vegetation can be used as indicators of the presence of landfill gases in the surface soil layers; however, the gases can travel laterally below vegetation without injuring it and appear at the surface at a greater distance from the landfill. The studies also demonstrated that sand and gravel pits are not good places for refuse disposal if lateral gas migration is to be prevented. If old sand and gravel pits are used as refuse, landfills, gas vents and seals should be placed at the outer edge of the landfill prior to refuse deposition. (See also W77-02394) (Kreager-FIRL)
W77-02413

AN EXPERIMENTAL HIGH-ASH PAPER MILL SLUDGE LANDFILL: SECOND ANNUAL REPORT,
Michigan State Univ., East Lansing. Div. of Engineering Research.
O. B. Andersland, W. A. Charlie, R. P. Vallee, and D. W. Marshall.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-239 618, Price codes: A11 in paper copy, A01 in microfiche. Report EPA-670/2-74-076b, December, 1974. 246 p, 58 fig, 39 ref, 83 tab.

Descriptors: *Sludge disposal, *Landfills, *Pulp wastes, Ultimate disposal, Wastes, Industrial wastes, Water pollution sources, Solid wastes, Sludge, Organic wastes, Consolidation, Soil mechanics, Soil stabilization, Waste disposal, Land forming, Leachate, Leaching, Slope stability, Slopes, Sulfates, Nitrogen, Phosphorus, Iron, Chlorides, Hardness(Water), Salts.

For the slope stability study, the experimental paper mill sludge landfill was altered by removal of one retaining dike. The landfill was excavated to form a 3:4 slope and two weeks later was trimmed to a 1:8 slope. Prior to this modification, vane shear strength and Dutch cone resistance data were obtained. Slope indicator and piezometers were installed. Laboratory work included consolidation tests on undisturbed sludge samples. It is shown that soil mechanics theory can be used to predict the stability of slopes excavated in a sludge landfill. The increase in shear strength of the sludge as a direct consequence of consolidatiion resulted in a stable 3:4 slope with small observed lateral movements. Lateral movements increased rapidly after excavation to the 1:8 slope. The low permeability of the sludge together with a decreasing rate of leachate flow associated with fill consolidation exerted a moderating effect on the quantity of leachate leaving the landfill. Leachate analyses showed that the quantities of sulfate, Kjeldahl nitrogen, phosphorus, iron, and chloride were below values cited for municipal refuse. Concentrations of mineral salts and hardness were similar to those for leachate originating in landfills of municipal refuse. (Witt-IPC)
W77-02555

AN EXPERIMENTAL HIGH-ASH PAPER MILL SLUDGE LANDFILL: FIRST ANNUAL REPORT,
Michigan State Univ., East Lansing. Div. of Engineering Research.
O. B. Andersland, R. P. Vallee, and T. A. Armstrong.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-239 869, Price codes: A09 in paper copy, A01 in microfiche. Report EPA-670/2-74-076a, December, 1974. 190 p, 67 fig, 36 ref, 43 tab.

Descriptors: *Sludge disposal, *Landfills, *Pulp wastes, Ultimate disposal, Wastes, Industrial wastes, Water pollution sources, Solid wastes, Sludge, Organic wastes, Consolidation, Soil mechanics, Soil stabilization, Waste disposal, Land forming, Leachate, Mechanical engineering, Lysimeters, Leaching.

An experimental landfill for paper mill sludge rich in ash (mineral elements) was constructed and monitored to obtain engineering data essential for development of guidelines and recommendations for the design and operation of future landfills for solid paper mill wastes. The landfill consisted of two sludge layers, with sand drainage blankets, an earth dike for lateral confinement, and a natural soil cover. The landfill was instrumented for settlement, water pressure, vertical and lateral earth pressure, temperature, sludge unit weights, specific gravity, and water content. Laboratory work was also conducted. A detailed description of the field behavior of the sludge is given along with predictions based on laboratory results and soil mechanics theory. Sampling of leachate from the sludge landfill at weekly intervals and laboratory analysis according to standard methods for the examination of water and waste water provided documentation as to leachate composition. A lysimeter study showed that passage of leachate through a minimal depth of soil should render the percolate innocuous. (Witt-IPC)
W77-02556

C(ROWN) Z(ELLERBACH)'S SOLIDS WASTE PROBLEMS AT WAUNA ARE REDUCED BY COMPOSTING,
Crown Zellerbach Corp., Wauna, Oreg.
M. L. Wysong.
Pulp and Paper, Vol. 60, No. 10, p 112-113, September, 1976.

Descriptors: *Sludge disposal, *Pulp and paper industry, *Biodegradation, Soil amendments, Temperature, Hydrogen ion concentration, Cellulose, Aeration, Operating costs, Costs, Pulp wastes, Oregon, Solid wastes, Waste disposal, Sewage treatment, Forest management.
Identifiers: *Composting.

Composting of a mixture of primary paper mill sludge and secondary sludge obtained from a municipal sewage-treatment facility at Wauna, Oregon, was investigated by Crown Zellerbach Corp. in order to determine the feasibility of forest amendment broadcasting as an alternative to landfilling for disposal of sludge. The composting operation was evaluated by measurement of volume reduction, total weight reduction, temperature, aeration, pH, and cellulose content. Composting provided volume and weight reductions in excess of 50%. A full-scale compost operation could be run for less than $100,000/year at this mill which generates an average of 70 dry tons/day. (Sykes-IPC)
W77-02572

STUDY OF DEWATERING OF CELLULOSIC SLUDGE FROM THE VISCOSE FIBER INDUSTRY (ISSLEDOVANIE PO OBEZVOZHIVANIYU TSELLYULOZNOGO SHLAMA PREDPRIYATII VISKOZNOGO VOLOKNA),
Lvovskii Politekhnicheskii Institut (USSR).
For primary bibliographic entry see Field 5D.
W77-02575

5F. Water Treatment and Quality Alteration

WATER SUPPLY AND SEWAGE TREATMENT IN ARID AREAS.
For primary bibliographic entry see Field 5D.
W77-02173

DESALINATION TO PLAY A MAJOR PART IN MIDDLE EAST WATER SUPPLY.
For primary bibliographic entry see Field 3A.
W77-02175

REMOVAL OF VIRUSES FROM WATER BY MAGNETIC FILTRATION,
Florida Univ., Gainesville. Dept. of Environmental Engineering Sciences.
For primary bibliographic entry see Field 5D.
W77-02214

POLYELECTROLYTE PERSISTENCE IN A MUNICIPAL WATER SUPPLY,
Minnesota Univ., Minneapolis. Div. of Environmental Health.
V. Goppers, and C. P. Straub.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 502, Price codes: A02 in paper copy, A01 in microfiche. (Sept. 15, 1975). 8 p, 1 fig, 5 ref. OWRT A-029-MINN(1).

Descriptors: *Polyelectrolytes, *Municipal water, *Water supply, Polymers, Chromatography, *Water treatment, Public health, *Pollutant identification, Organic compounds.

Polyelectrolytes or polymers are compounds of high molecular weight whose structure is made up of many smaller molecules -- monomers. These compounds contain a number of functional groups with reactive double bonds. In recent years, these synthetic polymers have found increasing use in water supply as coagulant and filter aids, and in the dewatering of sludges. The thin-layer chromatograms demonstrated that: (1) the polyelectrolyte is present in finished water, (2) the polyelectrolyte in finished water appears as the polymer and as monomers, (3) the polyelectrolyte or other added chemicals (e.g., chlorine) reacted with the organic compounds in raw water forming new substances which were transferred through the various stages of water treatment to the

finished water prior to discharge to the distribution system for human consumption. The finding of the polyelectrolyte or its monomers in the finished water in itself does not necessarily constitute a health hazard. However, the presence of this material in the finished water should encourage attempts to quantify the amounts present and their distribution within the various products of water treatment, i.e., finished water, sludge, backwash waters, etc., and their effects on the recycling and recovery of water treatment sludges. With such information available, it will be possible to evaluate the potential hazard of these substances on the public health of persons consuming these waters. (Walti-Minnesota)
W77-02221

THE BARRIER ROLE OF WATER TREATMENT INSTALLATIONS WITH RESPECT TO CERTAIN HETEROCYCLIC COMPOUNDS, (IN RUSSIAN),
Moskovskii Gosudarstvennyi Meditsinskii Institut (I) (USSR).
A. A. Korolev, and V. P. Laskina.
Gig Sanit 8, p 15-17, 1975.

Descriptors: *Water treatment, Organic compounds, Barriers, Potable water, Treatment facilities.
Identifiers: *Morpholine, *Piperidine, *Pyridines, *Heterocyclic compounds.

Heterocyclic compounds such as morpholine and piperidine are highly resistant to physico-chemical drinking water treatment. The barrier role of the water-works installations apparently is limited in respect to other heterocyclic compounds, particularly the pyridines, due to the close relation of their physico-chemical properties to those of the investigated substances.--Copyright 1976, Biological Abstracts, Inc.
W77-02240

HYGIENIC ASPECTS OF A STUDY OF BDELLOVIBRIO BACTERIOVORUS AS A NATURAL FACTOR OF SELF-PURIFICATION OF WATER BODIES, (IN RUSSIAN),
Institute of General and Municipal Hygiene, Moscow (USSR).
For primary bibliographic entry see Field 5C.
W77-02243

EVALUATION OF METHODS OF RECOVERING PATHOGENIC INTESTINAL MICROORGANISMS FROM WATER, (IN RUSSIAN),
Gorodskaya Sanitarno-Epidemiologicheskaya Stantsiya, Moscow (USSR).
K. M. Klimenkova.
Gig Sanit 8, p 86, 1975.

Descriptors: *Microorganisms, *Enteric bacteria, E coli, Pathogenic bacteria, Filters, Membranes, Water pollution, Magnesium, *Water treatment.
Identifiers: Lactose negatives, Selenite.

For recovering enteropathogenic bacteria (lactose negative and Escherichia coli), the bacteria were concentrated on membrane filters and cultivated on Endo medium; then the filters were placed in selenite and Mg enrichment media.--Copyright 1976, Biological Abstracts, Inc.
W77-02244

EFFECTIVENESS OF CONTINUOUS CHLORINATION OF WELL WATER BY DOSAGE CARTRIDGES IN TRANSCARPATHIA, (IN RUSSIAN),
R. I. Grishchenko.
Gig Sanit 10, p 92-93, 1975.

Descriptors: *Chlorination, *Water wells, Chlorine, Human diseases, Epidemiology, Water supply, *Disinfection, *Water treatment.
Identifiers: *Transcarpathia(USSR), Typhoid fever, USSR.

Continuous chlorination of wells by dosage cartridges maintains the level of residual Cl in the water within 0.3-0.5 mg/l and provides sufficiently effective decontamination for 28-30 days. Standard cartridges have an explicit advantage over nonstandard, since they enable calculation of the necessary quantity of Cl-active preparation and provide a uniform release of active Cl into the water. The wide use of the method of continuous chlorination of well water in localities (USSR) with a relatively high incidence of typhoid fever related epidemiologically with a well water supply can reduce the incidence considerably.--Copyright 1976, Biological Abstracts, Inc.
W77-02256

FLOW DATA COLLECTION FOR INFILTRATION-INFLOW ANALYSIS,
Whitman, Requardt and Associates, Baltimore, Md.
For primary bibliographic entry see Field 5D.
W77-02334

NEED FOR FLUORIDATION OF DRINKING WATER IN KRASNODON, (IN RUSSIAN),
Municipal Sanitary Epidemiology Station, Krasnodon (USSR).
O. V. Chernykh.
Gig Sanit 3, p 108-109, 1975.

Descriptors: *Fluoridation, *Potable water, Water supply, Public health, *Water treatment.
Identifiers: Caries(Children), *Krasnodon, Ukrainian-SSR, USSR.

Fluoride content in the drinking water of Krasnodon, Ukrainian SSR, USSR, was analyzed, and its effect on caries incidence of schoolchildren was studied. A high percentage of caries was found in 2031 examined children; the city's drinking water should be fluoridated.
W77-02338

WATER HARDNESS AND INCIDENCE OF MALIGNANT NEOPLASMS AMONG THE POPULATION, (IN RUSSIAN),
Minsk. USSR Research Inst. of Oncology and Medical Radiology, Minsk (USSR).
L. L. Livshits, A. G. Kokina, A. E. Okeanov, E. A. Gel'Fer, and A. A. Kuznetsova.
Gig Sanit 1, p 106-108, 1975.

Descriptors: *Hardness(Water), Human population, *Human diseases, Potable water, *Public health, Statistical methods.
Identifiers: *Belorussian-SSR, Bladder, Kidneys, *Neoplasms(Malignant), USSR.

Average water hardness in the Minsk hardwater district and Brest soft-water district (Belorussian SSR, USSR) are inversely related to the incidence of malignant neoplasms of the kidneys and urinary bladder among the rural population. In the presence of other environmental factors this relationship is not sufficiently strong to indicate low drinking water hardness as a causative factor in increased malignant neoplasm incidence.--Copyright 1976, Biological Abstracts, Inc.
W77-02384

REMOVAL BENEFITS: IT CAN BE TOO COSTLY,
Kansas City Water Dept., Mo.
For primary bibliographic entry see Field 5D.
W77-02436

CARPET AND RUG INDUSTRY CASE STUDY I: WATER AND WASTEWATER TREATMENT PLANT OPERATION,
Georgia State Univ., Atlanta.
For primary bibliographic entry see Field 5D.
W77-02574

5G. Water Quality Control

ANALYSIS OF STORM WATER SEEPAGE BASINS IN PENINSULAR FLORIDA,
Florida Univ., Gainesville. Dept. of Civil Engineering.
H. Rubin, J. P. Glass, and A. A. Hunt.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 393, Price codes: A07 in paper copy, A01 in microfiche. Florida Water Resources Research Center, Gainesville, Publication No. 39, September 1976. 121 p, 15 fig, 62 ref, 3 append. OWRT A-028-FLA(2). 14-34-0001-6010.

Descriptors: Pit recharge, Ponding, *Artificial recharge, Groundwater recharge, Infiltration, *Seepage, Water spreading, Aquifers, *Florida, *Drainage systems, Urbanization, *Storm water, *Flood control, Pollution abatement, Design criteria.

Rapid urbanization, currently proceeding in Florida, has resulted in significant problems with regard to both flood control and pollution abatement. The objective of the study was to search for the design procedures that may improve efficiency, safety and adequacy of drainage systems in peninsular Florida. Special attention was given to possiblities of recharging groundwater aquifers with excess storm water. Through such a system, partial solution to problems of inadequate potable water supply in some areas can be achieved simply as a byproduct of flood control systems. A conceptual design framework is presented. In developing this framework, a variety of disciplines involved in the solution of urban drainage systems in peninsular Florida are considered. Comparatively high levels of groundwater in many locations require consideration of two factors relating to the ability of seepage ponds to divert surface water to the aquifer. The engineer should study the ability of the pond to seep water and he should analyze the response of the groundwater table to the seeping water. With respect to these two factors, analyses and solutions adapted for engineering application are presented.
W77-02083

EVALUATION OF ESTUARINE SITE DEVELOPMENT LAGOONS,
Cook Coll., New Brunswick, N.J.
G. F. Walton, G. H. Nieswand, S. J. Toth, C. W. Stillman, and J. R. Westman.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 367, Price codes: A09 in paper copy, A01 in microfiche. Water Resources Research Institute, New Brunswick, New Jersey, Final Report, July 1, 1976. 167 p, 20 fig, 25 tab, 20 ref, append. OWRT B-040-NJ(5). 14-31-0001-3614.

Descriptors: *Estuarine environment, *Impaired water quality, *Lagoons, *Aquatic environment, *Environmental effects, *Wetlands, Bays, Coasts, Encroachment, Water quality, Water pollution, Salt marshes, Shores, Tidal waters, *New Jersey.
Identifiers: *Site development lagoons.

A large number of estuarine site development lagoon systems have been constructed along the New Jersey shore with little, if any, knowledge regarding the true nature of the system being created and its impact on the existing natural estuarine system. A comprehensive study and evaluation of these lagoon systems was undertaken including consideration of the physical, chemical, biological and socioeconomic conditions. While each chapter of the report includes a section on specific conclusions, certain general conclusions can be made. Namely, using Barnegat Bay as a standard, the lagoon waters were of poorer quality, due in large measure to the restricted and weakly-established water circulation patterns in the lagoons. In terms of the socioeconomic conditions, the residents are generally quite satisfied with their lagoon homes in

spite of their perception of major pollution and over-development problems. In fact, many owners are converting their homes to year-round residences.
W77-02088

A SUBMODEL FOR NITROGEN RELEASE FROM SEDIMENTS,
Copenhagen Univ. (Denmark). Freshwater Biological Lab.
For primary bibliographic entry see Field 5B.
W77-02099

MANAGING THE SOUTHWESTERN NATIONAL FORESTS FOR WATER AND RELATED RESOURCES,
Forest Service (USDA), Washington, D. C.
For primary bibliographic entry see Field 4A.
W77-02107

WATER USE IMPLICATIONS FOR NUCLEAR POWER STATIONS IN THE UNITED STATES OF AMERICA,
Columbia Univ., New York.
For primary bibliographic entry see Field 6G.
W77-02114

ON THE INCOME DISTRIBUTIONAL EFFECTS OF ENVIRONMENTAL MANAGEMENT POLICIES,
British Columbia Univ., Vancouver. Dept. of Economics.
H. F. Campbell.
Water Resources Research, Vol. 12, No. 5, p 1077-1080, October 1976. 3 tab, 6 ref, append.

Descriptors: *Water resources, *Income distribution, *Effects, *Environmental control, *Effluents, *Standards, *Treatment, Technology, Behavior, Simulation analysis, Prices, Mathematical models, Systems analysis, Optimum development plans.
Identifiers: *Environmental policy, *Environmental management, Effluent charges.

This paper analyzes the effects of three environmental policy instruments--effluent charges, effluent standards, and effluent treatment subsidies--in the context of a two-person two-firm general equilibrium model in which the distribution of income varies with the choice of policy instrument. It is demonstrated that, under reasonable assumptions about the income distribution process and the nature of consumer preferences, each policy instrument corresponds to a different optimal quantity of effluent and a different set of optimal prices. The implication of this result is that consideration of income distriubtional effects should play an integral part in the formulation of optimal environmental management policies. (Bell-Cornell)
W77-02124

CONTROLLING EROSION AND SEDIMENTATION AT CONSTRUCTION SITES,
For primary bibliographic entry see Field 4D.
W77-02146

HYGIENIC STANDARDIZATION OF DIETHYLBENZENE IN WATER BODIES, (IN RUSSIAN),
Kiev Research Inst. of General Communal Hygiene (USSR).
K. F. Meleshchenko.
Gig Sanit 6, p 90-92, 1975.

Descriptors: *Ion exchange, Resins, Public health, *Water quality standards, *Organic compounds, Toxicity, Odor, Lethal limit, Organoleptic properties.
Identifiers: *Benzene, Rabbit, Styrene, Dichloroethane, *Divinylbenzene, *Ion exchange resins.

The production of ion-exchange resins is related to the use of divinylbenzene, the starting materials for which are diethylbenzene, styrene, dichloroethane, etc. The threshold concentration of diethylbenzene in water with respect to odor and taste was 0.04 - 0.05 mg/l. Diethylbenzene doses of 0.0025 and 0.25 mg/kg do not affect warm-blooded animals (rabbits), whereas a dose of 2.5 mg/kg does. In the latter case there is a statistically significant decrease of the weight of the adrenal glands and summation of subthreshold impulses. The recommended maximum allowable concentration of diethylbenzene in water bodies is 0.04 - 0.05 ml/l, with the limiting index of the hazard of this preparation being its effect on the organoleptic properties of water.
W77-02152

FOURTH SEMIANNUAL INTERAGENCY BRIEFING, FEBRUARY 1975, WASHINGTON, D.C.,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Environmental Effects Lab.
For primary bibliographic entry see Field 8G.
W77-02158

THE COPPER INDUSTRY AND WATER IN ARIZONA,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 3E.
W77-02166

SWIMMING PARTICIPATION AND WATER QUALITY IN TOMPKINS COUNTY, NEW YORK,
Cornell Univ., Ithaca, N. Y. Dept. of Natural Resources.
T. L. Brown, and G. R. Reetz.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 357, Price codes: A04 in paper copy, A01 in microfiche. Cornell University Water Resources and Marine Sciences Center, Completion Report, November 1976. 53 p, 1 fig, 17 tab. OWRT B-039-NY(1). 14-31-0001-4110.

Descriptors: *Swimming, Water quality, *Water quality standards, *Recreation, *New York, Social participation, *Attitudes, Evaluation, Social values.
Identifiers: *Tompkins County(NY).

Following an intensive literature search, a systematic sample of Tompkins County households were surveyed to determine frequency of swimming participation, the degree to which residents swim in waters not approved for swimming, degree of public understanding and agreement with existing swimming standards, and the degree to which swimming participation is affected by perceptions of water quality. Findings indicated that most of Tompkins County's outdoor swimming occurs in natural area streams that are not regularly monitored by the local health department for water quality. Further, the majority of responding adults could not give an evaluation on the degree of strictness of existing standards for swimming. Attitudes toward water quality appear to have some influence on swimming participation and the choice of a swimming area, but in Tompkins County, other considerations such as convenience were more important.
W77-02185

CHANGES IN BENTHOS AND FISHES OF A STREAM ACCOMPANYING A SUBSTANTIAL REDUCTION IN PLANT NUTRIENTS,
Pennsylvania State Univ., University Park. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W77-02191

HERBICIDES AND SURFACE IRRIGATION-DO THEY MAKE A TEAM,
For primary bibliographic entry see Field 3F.
W77-02200

WATER POLLUTION INVESTIGATION: DULUTH-SUPERIOR AREA,
Midwest Research Inst., Kansas City, Mo.
For primary bibliographic entry see Field 5B.
W77-02202

COMPILATION OF STATE DATA FOR EIGHT SELECTED TOXIC SUBSTANCES, VOL. 1, FINAL REPORT,
Mitre Corp., McLean, Va.
E. R. Roberts, S. Spewack, S. Stryker, and S. Tracey.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-248 660, Price codes: A08 in paper copy, A01 in microfiche. Environmental Protection Agency, Washington, D.C. Report EPA 560/7-75-001-01, September 1975. 162 p, 2 tab, 3 fig.

Descriptors: *Data collections, *Beryllium, *Cadmium, *Chromium, *Lead, *Mercury, *Polychlorinated biphenyls, *Arsenic compounds, *Monitoring, Public health, Metals, Heavy metals, Trace elements, Lethal limit.
Identifiers: *Arsenic, *Cyanide, Arylphosphate, Benzene, 3,3'-dichloro-benzidine, *Ethylene glycol, Hydrazine methyl chloroform, *Anapthylamine, Acrylonitrite, Monitoring capability, *State Monitoring agencies.

In June 1974, the Office of Toxic Substances, EPA, contracted with MITRE to collect and analyze toxic substances data in the U.S. In the next 14 months, MITRE contacted agencies in 20 key states and collected and analyzed their monitoring data. This report describes that effort and discusses the amount, type and usefulness of the data and the toxic substances monitoring capabilities of the state agencies contacted. Substances studied were Arsenic, beryllium, cadmium, chromium, cyanide, lead, mercury, polychlorinated biphenyls, and other toxic substances. The monitoring capabilities of various states were described and the particular toxicity problems as viewed by the states are given. (See also W77-02205) (Katz)
W77-02204

COMPILATION OF STATE DATA FOR EIGHT SELECTED TOXIC SUBSTANCES, VOL. IV, COMPILATIONS OF SUMMARIES AND ANALYSES OF STATE DATA,
Mitre Corporation, McLean, Va.
E. Roberts, R. Spewak, S. Stryker, and S. Tracey.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-248 663, Price codes: A99 in paper copy, A01 in microfiche. Environmental Protection Agency, Washington, D.C., Report EPA 560/7-75-001-4, September 1975, 644 p., 125 tab., 24 fig., append.

Descriptors: *Arsenic compounds, *Beryllium, *Cadmium, *Chromium, *Lead, *Mercury, *Polychlorinated biphenyls, *Data collections, Data storage and retrieval, *Zinc, *Mussels, *Fish, *Biota, *Wildlife, Public Health, Sewage, United States.
Identifiers: *Cyanide, *Arsenic, *Toxic substances.

In June 1974, the Office of Toxic Substances, EPA, contracted with MITRE to collect and analyze toxic substances data in the U.S. In the next 14 months MITRE contacted agencies in 20 key states and collected and analyzed their monitoring data. This appendix contains all the summaries and analyses of state agency data that were presented in the four quarterly reports during the course of the project. Substances discussed were: arsenic, beryllium, cadmium, chromium, cyanide,

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lead, mercury, polychlorinatd biphenyls, zinc. (Katz)
W77-02205

SYSTEM FOR EVALUATION OF THE HAZARDS OF BULK WATER TRANSPORTATION OF INDUSTRIAL CHEMICALS,
National Academy of Sciences, Washington, D.C. Committee on Hazardous Materials.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-782 476, Price codes: A04 in paper copy, A01 in microfiche. Coast Guard Report CG-D-113-74, February 1974. 42 pp., 14 tab., 12 ref.

Descriptors: *Transportation, Ships, *Safety, Barges, Distribution, Harbors, Water pollution, Public health, Environmental Sanitation, Water quality, *Hazards, Negligence, *Safety, *Warning systems, Industries, Marketing.
Identifiers: *Bulk water transportation, Industrial chemicals, Fire hazard, Reactivity hazards.

The U. S. Coast Guard has requested the assistance of the Committee on Hazardous Materials of the National Research Council in developing a system of evaluating the potential hazard associated with the water transportation of industrial chemicals in bulk. Numerous schemes for assessing the hazards of materials have been developed by various organizations, but none completely fulfils the Coast Guard requirements since most of the existing schemes have been developed for purposes other than assessment of hazard in bulk water transportation. It was also suggested by the Coast Guard that the system of hazard evaluation should deal with the several kinds of hazards presented in varying degrees by individual chemicals. This is a report of results, to date, of the efforts of the Committee on Hazardous Materials to develop and evolve a scheme of hazard evaluation. (Katz)
W77-02206

ACID MINE DRAINAGE (A BIBLIOGRAPHY WITH ABSTRACTS),
National Technical Information Service, Springfield, Va.
January 1975, 137 p., 137 ref.

Descriptors: *Mine acids, *Mine drainage, *Mine wastes, *Mine water, *Bibliographies, *Abstracts, Mining, Environmental effects, Environmental control, Waste treatment, Ecology, Mining engineering, Engineering geology, Waste disposal

Various aspects of mine acid drainage are covered in 137 abstracts. Primarily they cover control and treatment techniques; however, also included are studies on the ecological effects, sources, and formation. (Katz)
W77-02207

WATER QUALITY IMPACTS OF URANIUM MINING AND MILLING ACTIVITIES IN THE GRANTS MINERAL BELT, NEW MEXICO,
Environmental Protection Agency, Dallas, Tex. Region VI.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-251 470, Price codes: A09 in paper copy, A01 in microfiche. Report EPA 906/9-75-002, September 1975, 182 p., 15 tab., 12 fig., 34 ref.

Descriptors: *Water quality, *Mining, Waste disposal, Water pollution, *Groundwater, Potable water, Surface water, *Uranium, *Radioisotopes, *Mine water, Mills, Waste disposal, Municipal water, *New Mexico, Public Health, Environment, Water supply.
Identifiers: *Selenium, *Uranium mining, *Uranium milling, *Grants mineral belt(N Mex).

Ground water in the study area is affected by mining and waste disposal associated with mining and milling. Contamination appears in close proximity to the mining and milling centers with the exception of more widespread selenium contamination of shallow ground water adjacent to the United Nuclear-Homestake Partners Mill. Contamination of municipally operated water supplies in the study area is not evident. Potable supplies derived from mine water at four industrial sites exceed applicable limits for selenium in drining water. Three such systems exceed limits for Radium 226. Recommendations developed are designed to assist the State in future regulation of uranium mining and milling for the purpose of safeguarding public health and insuring future environmental quality. (Katz)
W77-02208

EAGLE LAKE POLLUTION CONTROL PROJECT, EAGLE LAKE KANDIYOHI COUNTY, MINNESOTA, BENCH MARK STUDIES,
Minnesota Univ., Minneapolis. Water Resources Research Center
T. E. Straw, R. S. Abbott, R. J. Grohs, R. F. Holt, and J. J. Latterell
Bulletin 90, August 1976. 152 p, 34 fig, 36 tab, 54 ref. OWRT A-999-MINN(43), 14-34-0001-7050.

Descriptors: Community development, Soil disposal fields, Water pollution control, Lakes, *Minnesota, *Agricultural runoff, *Sewage, *Nutrient removal, Diversion, *Eutrophication, Recreation, *Attitudes.
Identifiers: *Eagle Lake(Minn)

Cooperative efforts are described of a lake community and several governmental agencies that were undertaken to alleviate increasing cultural eutrophication in Eagle Lake, Kandiyohi County, Minnesota. Two non-point nutrient sources were identified: agricultural runoff and domestic sewage. A lake-encircling collection line now diverts the sewage to a treatment plant. Earthen dams with soil absorption fields have been tested as a mean of removing nutrients from part of the watershed runoff. Coincident with initiation of these anti-pollution measures, a comprehensive research project was initiated. Detailed studies of the chemical, physical, and biological conditions in the lake were conducted before the sewage system was completed. Water and nutrient budget estimates have been made. Eagle Lake can be classified as moderately eutrophic. Socio-economic surveys of lakeshore residents, other watershed residents, and non-resident ice fishing users resulted in a base line profile of recreational use of Eagle Lake and of attitudes toward the lake and toward the anticipated improvements. Hopefully these data will suggest a model of community action. These benchmark studies, while of intrinsic interest, will reach their ultimate utility as a reference for comparison with conditions in the watershed after the pollution control measures have been in operation. Such future studies are anticipated.
W77-02215

A COMPREHENSIVE SYSTEMS ENGINEERING STUDY OF THE TRUE ECONOMIC VALUE OF UNPOLLUTED WATER VERSUS VARYING DEGREES OF POLLUTED WATER,
Rhode Island Univ., Kingston. Dept. of Mechanical Engineering and Applied Mechanics.
C. D. Nash, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 493, Price codes: A02 in paper copy, A01 in microfiche. Completion Report, (1976). 20 p, 91 ref. OWRT A-057-RI(1). 14-31-0001-4040.

Descriptors: Costs, *Systems analysis, Water pollution, Potable water, *Cost comparisons, Cost analysis, *Pollution taxas(Charges), *Water costs.
Identifiers: *Water pollution costs.

True costs associated with water pollution are described. Offset costs are included. Total water pollution cost is specified as including cleanup costs, industrial use costs, recreational use costs, health costs, and esthetic costs. A new concept is introduced of using the offset costs of pollution as a basis for setting tariffs to place competition between domestic and foreign companies on an equal global pollution basis.
W77-02220

THE ROLE OF MOLLUSKS AS BENTHOS COMPONENTS IN PURIFICATION OF WATER BODIES FROM ASCARIS SUUM EGGS, (IN RUSSIAN),
Chelyabinsk Meditsinskii Institut (USSR)
S. E. Asitinskaya.
Parazitologiya (Leningr) 9(5), p 432-433, 1975.

Descriptors: *Mollusks, *Benthos, *Water purification
Identifiers: *Ascaris Suum eggs, Bithynia tentaculata, Galba-palustris, Radix-auricularia, Radix-lagotis, Radix-ovata, Radix-peniger

Fresh water mollusks Galba palustris and Bithynia tentaculata feed on Ascaris eggs, destroy them (10-20%) and hinder their development as compared to controls. These mollusks participate in the purification of water bodies from Ascaris eggs. Eggs swallowed by the mollusks Radix ovata, R. peniger, R. auricularia, R. lagotis develop normally. Radix serve to scatter eggs over the bottom of the water body.--Copyright 1976, Biological Abstracts, Inc
W77-02230

SOME HYGIENIC PROBLEMS RELATED TO THE USE OF HERBICIDES OF THE 2,4-DICHLOROPHENOXYACETIC ACID GROUP, (IN RUSSIAN),
Tomsk Meditsinskii Institut (USSR)
V. P. Paderova
Gig Sanit 9, p 96-97, 1975.

Descriptors: *Herbicides, Public health, Trees, *Acids, *2-4-D, Chemcontrol, *Weed control, Shrubs, Organic acids, Vegetation, Water pollution sources
Identifiers: *Acetic acids.

Herbicides (derivatives) of the 2,4-D group used for chemical weeding and eradication of undesirable trees and shrubs enter into surface waters and aquifers. The entry of the herbicides into water sources depends on the relief, meterological conditions and other factors. Maximum contamination of water sources occurs with the use of large doses of the herbicides for eradicating trees and shrubs in the immediate vicinity of surface waters.--Copyright 1976, Biological Abstracts, Inc.
W77-02231

EFFECT OF MINE WASTEWATERS ON THE WATER QUALITY OF THE OL'KHOVOYE RESERVOIR, (IN RUSSIAN),
For primary bibliographic entry see Field 5C.
W77-02242

EVALUATION OF METHODS OF RECOVERING PATHOGENIC INTESTINAL MICROORGANISMS FROM WATER, (IN RUSSIAN),
Gorodskaya Sanitarno-Epidemiologicheskaya Stantsiya, Moscow (USSR).
For primary bibliographic entry see Field 5F.
W77-02244

THE ROLE OF SILT IN ERADICATION OF ONCOMELANIID SNAILS IN GRASSY BEACHES, (IN CHINESE),
Acta Zool Sin 21(2), p 125-126, 1975.

Descriptors: *Silts, Silting, *Snails, Beaches, Asia, Floods.
Identifiers: *China, *Oncomelanid snails, *Schistosoma.

Oncomelaniid snails (intermediate hosts of Schistosoma) in Chung-chou, Chien-li Hsien, China, were greatly reduced after the 130-150th day of immersion in water of the area during a 1973 flood. Silt released by a rush of water effectively reduced the number of oncomelaniid snails.--Copyright 1976, Biological Abstracts, Inc.
W77-02245

PARROT'S-FEATHER (MYRIOPHYLLUM AQUATICUM (VELL.) VERDC.), AN AGGRESSIVE WATER WEED IN PORTUGAL, (IN PORTUGUESE),
Estacao Agronomica National, Oeiras (Portugal).
A. N. Teles, and A. R. Pinto Da Silva.
Agron Lusit 36(3), p 307-324, 1975.

Descriptors: *Aquatic weeds, Europe, *Aquatic weed control, Water pollution control, Chemcontrol, Fertilizers.
Identifiers: Myriophyllum-aquaticum, *Parrotsfeather, *Portugal, River Tagus(Portugal).

The occurrence of M. aquaticum in Portugal was announced in 1961. However, collections of this plant in NW and central localities date from 1936 and 1953. The available data from herbaria and direct searching indicate that the strongest and most aggressive infestation occurs in ditches and small rivers with reduced flow in the lower valley of the River Tagus in Ribatejo province. A revision of control procedures is given and the possibilities of the utilization of this water weed as an additional source of feedstuffs and as a fertilizer to offset the costs of mechanical removal of the plants and their use in stripping nutrients from excessively eutrophic waters are discussed. Chemical analyses concerning Portuguese plants are presented and compared with those of other aquatic species.--Copyright 1976, Biological Abstracts, Inc.
W77-02247

MAXIMUM ALLOWABLE CONCENTRATION OF LEAD IN SURFACE WATERS, (IN RUSSIAN),
Sverdlovsk Research Inst. of Industrial Hygiene and Occupational Disease (USSR).
For primary bibliographic entry see Field 5C.
W77-02262

DYNAMICS OF THE CONTENT OF SOME ORGANIC TOXIC SUBSTANCES IN PLANTS IRRIGATED WITH EFFLUENTS OF THE COAL-TAR CHEMICAL INDUSTRY, (IN RUSSIAN),
Kiev Inst. of Nutritional Hygiene (USSR).
For primary bibliographic entry see Field 5C.
W77-02263

HYGIENIC STANDARDIZATION OF OCTYLIC STABILIZERS OF POLYVINYLCHLORIDE IN WATER BODIES, (IN RUSSIAN),
Moskovskii Gosudarstvennyi Meditsinskii Institut I) (USSR).
). V. Golovanov.
Gig Sanit 5, p 36-39, 1975.

Descriptors: *Water quality standards, Chlorides, Public health, Organic compounds, Lethal limit, Rodents.
Identifiers: *Polyvinylchlorides, *Octylic stabilizers.

The threshold concentrations (TC) of diisobutylmaleatedioctylin (DIBMDP) and ethylenisthioglycolatedioctylpewter (EBTGDP) according to the organoleptic indiced of noxiousness mount of to 0.1 mg/kg. Judging by the effect roduced on the sanitary regimen of water bodies ne TC of DIBMDP equals 0.6 mg/l and that of BTGDP 0.01 mg/l. The ineffective dose of IBMDP in a chronic sanitary-toxicologic experiient amounts to 0.001 mg/kg and that of EBTGDP 0.0001 mg/kg, which is equivalent to their concentrations in water at levels of 0.02 and 0.002 mg/l. These are the recommended maximal permissible concentrations for water bodies. (Experiments were conducted on rats, rabbits and guinea pigs.)--Copyright 1976, Biological Abstracts, Inc.
W77-02264

EXPERIMENTAL STUDY OF SAFE LEVELS OF THE HERBICIDES LINURON AND DICHLORPHENYLOXYUREA IN WATER BODIES, (IN RUSSIAN),
Meditsinskii Institut, Saratov (USSR).
N. N. Mironenko.
Gig Sanit 7, p 46-49, 1975.

Descriptors: *Herbicides, Toxicity, *Lethal limit, *Legislation, *Water quality standards, Rodents, Ureas.
Identifiers: *Linuron, *Dichlorophenylurea, USSR.

On the basis of sanitary-toxicologic experiments using mice, rats and rabbits, the suggested maximal permissible concentrations in water bodies are 1.0 mg/l for linuron and 0.8 mg/l for dichlorphenyloxyurea (an intermediate in linuron production). These standard levels were approved by legislation. (The sanitary-toxicologic index of noxiousness is mentioned.)--Copyright 1976, Biological Abstracts, Inc.
W77-02265

STATE CONSIDERATION OF THE RIVERS ZETA AND MORACA BASED ON THE CHEMICAL CONTROL, (IN SERBO-CROATIAU),
Meditsinskii Institut, Titograd (Yugoslavia).
S. Filipovic.
Glas Repub Zavoda Zast Prir Titograd, 8, p 151-159, 1975. (English summary).

Descriptors: *Chem control, *Sampling, Industrial wastes, Sewage, Europe, *Water pollution control, *Pollution abatement.
Identifiers: *Yugoslavia, Zeta River(Yugoslavia), Moraca River(Yugoslavia).

From Apr. 11, 1973-Nov. 7, 1974, samples were taken from sewage and industrial waste discharge areas in the Zeta and Moraca rivers (Yugoslavia). The chemical parameters were studied and the results are presented.--Copyright 1976, Biological Abstracts, Inc
W77-02266

MEASURES FOR THE PROTECTION OF THE RIVERS ZETA AND MORACA, (IN SERBO-CROATIIAU),
Zavod za Zastitu Prirora, Titograd (Yugloslavia).
K. Zunjic.
Glas Repub Zavoda Zast Prir 8, p 161-167, 1975.

Descriptors: Water pollution sources, *Water pollution control, *Pollution abatement, Rivers, Water supply, Europe, Regulation.
Identifiers: *Yugoslavia, Zeta River(Yugoslavia), Moraca River(Yugoslavia).

The first signs of pollution of the Zeta and Moraca rivers (Yugoslavia) are reported. The quantity and quality of waste waters from the most common pollution sources were determined. Pollution control measures are described.--Copyright 1976, Biological Abstracts, Inc.
W77-02267

SANITARY-HYGIENIC ASPECTS OF THE USE OF NEW PREPARATIONS FOR CONTROLLING SEEPAGE IN WATER BODIES, (IN RUSSIAN),
Kiev Research Inst. of General Communal Hygiene (USSR).
For primary bibliographic entry see Field 4A.
W77-02269

WAYS OF PREVENTING THERMAL POLLUTION OF WATER BODIES BY WASTEWATERS OF NUCLEAR POWER PLANTS, (IN RUSSIAN),
A. N. Marei.
Gig Sanit 11, p 83-86, 1975.

Descriptors: *Thermal pollution, *Nuclear powerplants, Water pollution control, *Pollution abatement, Water quality standards, *Cooling towers, *Mixing, Legislation.
Identifiers: *USSR water pollution legislation.

Nuclear power plants are a potential source of thermal water pollution. To regulate temperature in natural water bodies, Soviet legislation established standards allowing its summer increase by no more than 3C. Observance of this requirement can be provided in 2 basic ways. The first is to accelerate the mixing of thermal discharges with the entire water mass, mainly by using the hydrologic factor. Its effectiveness depends primarily on the relationship of the wastewater discharge and river discharge. In Soviet practice this method as a rule is not used. The second method is to localize the thermal waters in the region of their occurrence and cool them in closed circulating water supply systems. At comparatively small nuclear power plants this is achieved by cooling towers and at new, larger plants by a system of artificial cooling ponds.--Copyright 1976, Biological Abstracts, Inc.
W77-02271

RATE OF DISSOLUTION OF PHOSPHATE FROM MINERALS AND SOILS,
Montana State Univ., Bozeman. Dept. of Chemistry.
For primary bibliographic entry see Field 2G.
W77-02275

EFFECTS OF WATERHYACINTH COVER ON WATER CHEMISTRY, PHYTOPLANKTON, AND FISH IN PONDS,
Auburn Univ., Ala. Dept. of Fisheries and Allied Aquacultures.
C. McVea, and C. E. Boyd.
Journal of Environmental Quality, Vol. 4, No. 3, 1975. p 375-402, 5 tab, 27 ref.

Descriptors: *Water hyacinth, Aquatic life, *Water chemistry, *Aquatic weeds, Water quality, Fish, Ponds, Pondweeds, Phosphorus, *Phytoplankton, Aquatic weed control.

Waterhyacinth cover of 0, 5, 10, or 25% surface was established in fertilized ponds stocked with the fish, Tilapia aurea, at Auburn, Alabama. Measurements of water chemistry, phytoplankton density, and fish production were made during the 1973 growing season. Phytoplankton production was less in ponds with 10 and 25% cover by waterhyacinth than in ponds with 0 and 5% cover. Competition of waterhyacinth with phytoplankton involved shading and removal of phosphorus from the water. Concentrations of dissolved oxygen were lowest in ponds with 25% cover, but oxygen tensions in all ponds were adequate for survival and growth of fish. Reduction in phytoplankton growth in ponds with 10 and 25% cover resulted in much lower fish prodcution. The presence of 5% cover by waterhyacinth did not significantly affect fish production. (Skogerboe-Colo St)
W77-02291

A COMPARISON OF NITROGEN, PHOSPHORUS, AND CARBON IN SEDIMENTS AND SOILS OF CULTIVATED AND NONCULTIVATED WATERSHEDS IN THE NORTH CENTRAL STATES,
Agricultural Research Service, Oxford Miss.
J. C. Ritchie, A. C. Gill, and J. R. McHenry.
Journal of Environmental Quality, Vol. 4, No. 3, 1975. p 339-341, 5 tab, 12 ref.

U. OF I. URBANA-LIBRARY

Descriptors: *Nitrogen, *Phosphorus, *Carbon, *Return flow, Water quality, Sediments, Nutrients, Nutrient removal, Cultivation, Cultivated lands, Watersheds(Basins), Central US.

Soil and sediments from six cultivated watersheds and from six noncultivated watersheds were sampled and the concentration of nitrogen, phosphorus, and carbon was determined. No significant difference was found in the concentration of N, P, or C with depth in the soils or sediments. Concentration of N,P, and C were not significantly different in the soils and sediments of the cultivated watersheds; however, the sediments of the noncultivated watersheds had significantly less N and organic P than the watershed soils. Less accumulation of N,P, and C is occurring in the noncultivated watershed sediments than in the cultivated watershed sediments. These data indicate that sediment source is probably an important factor in determining N,P, and C concentration in reservoir sediments. (Skogerboe-Colo St)
W77-02292

COMPARISON OF METHODS FOR THE DETERMINATION OF TOTAL PHOSPHORUS IN WATERS CONTAINING PARTICULATE MATERIAL,
Massey Univ., Palmerston North (New Zealand). Dept. of Soil Science.
For primary bibliographic entry see Field 5A.
W77-02293

THE DISTRIBUTION OF TWO MOSQUITO-LARVIVOROUS FISHES, GAMBUSIA AFFINIS AND ORYZIAS LATIPES, IN THE TOKYO METROPOLITAN AREA, (IN JAPANESE),
Tokyo Univ. (Japan). Dept. of Parasitology.
Y. Wada, Y. Sawara, J. Niiyama, Y. Fukabori, and Y. Nakamura.
Jpn J Sanit Zool. 25(3), p 285-288, 1974.

Descriptors: *Ecological distribution, *Distribution, *Fish, *Streams, *Ditches, *Swamps, Surface waters, Water pollution, Rivers, Sewage, Ponds.
Identifiers: Gambusia affinis, Japan, *Medaka, Oryzias latipes, Tokyo, *Topminnow, *Mosquito fish, Rice paddies, Kanto plain, *Bay of Tokyo, Yokohama, Chiba.

The distribution (in the Tokyo Metropolitan area; Kanto Plain) of the 2 mosquito-larvivorous fishes, G. affinis (top minnow or mosquito fish) and O. latipes (medaka) was studied by direct inspection and from the response to questionnaires sent to 859 middle schools in the prefectures of Gumma, Tochigi, Ibaraki, Saitama, Chiba, Kanagawa and Tokyo, Japan. G. affinis is a poeciliid ovoviviparous fish introduced into Japan in 1916 from southern USA via Hawaii and Taiwan for malaria control, and was noted recently to be distributed in rather polluted waters in and around the city of Tokyo, whereas, O. latipes is a native fish widely distributed in streams and ditches containing cleaner water. G. affinis was found in ditches and swamps in the more urbanized areas near the coast of the Bay of Tokyo, especially in the cities of Tokyo, Yokohama and Chiba, and also in the areas north of Tokyo lined by the Rivers Arakawa and Furutonegawa, where the waters were more or less polluted by sewage. Sporadic distributions of this species were noted in the ponds in Tokyo, Utsunomiya and Tsuchiura where the fish had been introduced artificially. O. latipes was found in the rural areas surrounding these large cities, particularly in rice paddles and streams in Kanagawa, Saitama, Gunma, Tochigi, Ibaraki and Chiba Prefectures. (Large numbers of Gambusia were observed inhabiting the Bay of Tokyo near the wharf of Tokyo Harbor; it is probably established in a number of canals along the Bay shore.)--Copyright 1975, Biological Abstracts, Inc.
W77-02297

PROJECT DEVELOPMENT AND DATA PROGRAMS FOR ASSESSING THE QUALITY OF THE WILLAMETTE RIVER, OREGON,
Geological Survey, Portland, Oreg. Water Resources Div.
For primary bibliographic entry see Field 2E.
W77-02301

SELECTION OF STREAMFLOW AND RESERVOIR-RELEASE MODELS FOR RIVER-QUALTIY ASSESSMENT,
Geological Survey, Jackson, Miss.; and Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 2A.
W77-02302

PRELIMINARY SELECTION OF STORM-WATER BASINS SUITABLE FOR INFILTRATION OF RECLAIMED WATER IN NASSAU COUNTY, LONG ISLAND, NEW YORK,
Geological Survey, Albany, N.Y. Water Resources Div.
D. A. Aronson.
Open-file report 76-668, May 1976. 39 p, 2 fig, 3 tab, 8 ref.

Descriptors: *Groundwater recharge, *Artificial recharge, *Reclaimed water, *Storm runoff, *Infiltration, Controlled drainage, Water storage, Groundwater availability, Water supply, *New York.
Identifiers: *Nassau County(NY).

A survey was made of 205 storm-water basins south of the ground-water divide and north of Hempstead Turnpike in Nassau County, Long Island, N.Y., to determine which would be best suited for infiltration of reclaimed water. Selection depended on infiltration area, location with respect to the ground-water divide and to planned transmission mains, tendency to retain storm runoff, underlying lithology, and depth to water table. The total maximum infiltration area of 14 selected basins is 60.2 acres, or 2,620,900 square feet (0.24 square kilometers). If 5-foot (1.5-meter) - high partitions were constructed in the basins to divide each into approximately equal halves and reclaimed water were applied in half of each basin to a depth of 5 feet (1.5 meters), using an application-rest cycle, a total area of 25.2 acres (0.10 square kilometers) would be available for supplemental recharge; the remaining infiltration area could be used for disposal of storm runoff. (Woodard-USGS)
W77-02322

ESTUARINE POLLUTION CONTROL: OBJECTIVES AND PRIORITIES,
K. D. Staples.
Proceedings of the Institution of Civil Engineers, Vol. 60, Part 1, p 329-343, August, 1976. 5 fig, 2 tab, 8 ref.

Descriptors: *Estuaries, *Water pollution control, *Hydraulics, *Sewage, *Industrial wastes, Suspended solids, Organic compounds, Heavy metals, Toxicity, Dissolved oxygen, Tidal effects, Control systems, Economics, Aeration, Mathematical models, Surface waters, Effluents.
Identifiers: Great Britain.

The forms and hydraulic regimes of estuaries are described along with the nature and effect of pollutants arising from sewage and industrial waste discharges on developed estuaries. Pollutants contributed to a developed estuary normally include three important elements: suspended solids, dissolved colloidal biodegradable compounds, and dissolved toxic chemicals including heavy metals. The effect of individual pollutants on a particular estuary is dependent on their volume and the estuary regime, particularly the tidal excursion and retention period within the waters. The point of pollutant contribution is important in all cases, with the pollutant's effect being greater at higher points of contribution in the estuary. Where high water quality is desired, a minimum dissolved oxygen level of about 40% is recommended. Mathematical modeling procedures can be used to equate pollutant input with the dilution and transport effected by the tidal flow and the reaeration and oxidation potential of the estuary, thus allowing for the establishment of pollution control policies that minimize expense. The costs of proposed estuary pollution control works for several major British estuaries are compared, and priorities for the staged implementation of typical control schemes are discussed. (Kreager-FIRL)
W77-02343

MINNEAPOLIS-ST. PAUL: LAND OF THE 'SHINING BIG-SEA-WATERS',
Metropolitan Waste Control Commission, St. Paul, Minn.
For primary bibliographic entry see Field 5D.
W77-02351

SURVEYING AMERICA'S LAKES.
For primary bibliographic entry see Field 5C.
W77-02375

TOWARD A MORE MEANINGFUL INDEX OF SLUDGE QUALITY,
Carnegie-Mellon Univ., Pittsburgh, Pa.
B. Fitch, and P. Kos.
Journal Water Pollution Control Federation, Vol. 48, No. 8, p 1979-1987, August, 1976. 11 fig, 1 ref.

Descriptors: *Activated sludge, *Suspended solids, *Physical properties, *Measurement, *Waste water treatment, Biological treatment, Performance, Sludge, Mathematical studies.
Identifiers: Sludge volume index, *Sludge quality index.

A new index of sludge quality which is independent of the concentration and characteristic of solids quality is proposed as a replacement for the conventionally used sludge volume index. The new index of sludge quality accounts for the functional relationship between sludge volume index and suspended solids and is based on the same test data as the sludge volume index. Although the existing procedure for sludge volume index determination correlates reasonably well with settleability when the settled sludge volume is below about 300 cu cm/liter, above that level the sludge volume index is a strong function of suspended solids concentration. The sludge quality index which takes this functional relationship into account thus offers a superior means for characterizing the settleability of activated sludge. When the solids settle to less than about 300 cu cm, the two indices are identical. (Kreager-FIRL)
W77-02378

THE INFLUENCE OF HIGH QUANTITIES OF MANURE ON SOIL WATER, AND PLANTS, (IN GERMAN),
Agricultural Experiment Station, Oldenburg (West Germany).
H. Vetter, and A. Klasink.
Landwirtsch Forsch 28(3), p 249-268, 1975.

Descriptors: *Farm wastes, Soil water, Plant pathology, Waste disposal, Crops, Cattle, Water reuse, Recycling.

Risks of water and soil pollution due to spreading manure in excess are small; only 2% of all livestock farms have excess manure in relation to their cultivated land. Most must use large amounts of mineral fertilizer. When a large region has excess manure, disposal is a problem. The waste disposal law prescribes that land spreading of manure must be controlled when manure application exceeds the usual quantity (the amount produced by 3 cattle equivalents). The allowable quantity of manure may vary between 3 and 6 cat-

le equivalents, depending on soil characteristics and cultivated crops.--Copyright 1976, Biological Abstracts, Inc.
W77-02387

TRACE ELEMENTS IN THE ENVIRONMENT OF SOME GOITER REGIONS OF THE TASHKENT OBLAST, (IN RUSSIAN),
Uzbekskii Nauchno-Issledovatelskii Institut Sanitarii, Gigieny i Profzabolevanii, Tashkent (USSR).
T. I. Vezhnevets, M. M. Baltabaev, and V. N. Zinkina.
Gig Sanit 1, p 101-102, 1975.

Descriptors: *Trace elements, Copper, Cobalt, Zinc, Iodine, Soils, Foods, *Human diseases, Public health, Environment, Distribution.
Identifiers: Goiter region, *Tashkent oblast, USSR, Uzbek-SSR, *Endemic goiter, Biosphere.

The content of trace elements (I, Co, Cu, Zn) in soil, water and food products of 7 regions of the Tashkent oblast, Uzbek SSR, USSR, was studied to establish whether there was a relationship between the distribution of endemic goiter among the population and the quantity of these elements in the biosphere. The population receives an insufficient quantity of I and Co in food.--Copyright 1976, Biological Abstracts, Inc.
W77-02388

OCEAN DUMPING PHASE-OUT IN EPA REGION II,
For primary bibliographic entry see Field 5E.
W77-02393

GAS AND LEACHATE FROM LANDFILLS: FORMATION, COLLECTION, AND TREATMENT. PROCEEDINGS OF A RESEARCH SYMPOSIUM.
Municipal Environmental Research Lab., Cincinnati, Ohio.
For primary bibliographic entry see Field 5E.
W77-02394

CURRENT EPA RESEARCH ACTIVITIES IN SOLID WASTE MANAGEMENT,
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 5E.
W77-02396

CURRENT OFFICE OF SOLID WASTE MANAGEMENT PROGRAMS - LANDFILL ACTIVITIES,
Environmental Protection Agency, Washington, D.C. Office of Solid Waste Management Programs.
For primary bibliographic entry see Field 5E.
W77-02397

CURRENT SOLID WASTE RESEARCH ACTIVITIES IN NEW YORK STATE,
New York State Dept. of Environmental Conservation, N. Y. Div. of Solid Waste Management.
For primary bibliographic entry see Field 5E.
W77-02398

CURRENT SOLID WASTE MANAGEMENT ACTIVITIES IN PUERTO RICO,
Puerto Rico Environmental Quality board, San Juan.
For primary bibliographic entry see Field 5E.
W77-02399

LANDFILL RESEARCH WORK IN PROGRESS AT HARWELLS HAZARDOUS MATERIALS SERVICE,
Atomic Energy Research Establishment, Harwell (England).
For primary bibliographic entry see Field 5E.
W77-02400

KELP HABITAT IMPROVEMENT PROJECT,
California Inst. of Tech., Pasadena. W. M. Keck Lab. of Environmental Engineering Science.
For primary bibliographic entry see Field 2L.
W77-02417

ECONOMIC EFFECTS OF ENFORCEMENT VARIABLES ON COMMERCIAL OIL POLLUTION CONTROL STRATEGY,
Naval Postgraduate School, Monterey, Calif.
R. C. Cook.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-016 442, Price codes: A05 in paper copy, A01 in microfiche. MS thesis, September 1975. 91 p. 8 fig., 10 tab., 24 ref., 3 append.

Descriptors: *Oil spills, *Decision making, *Economic justification, *Industries, Oil pollution, Pollution abatement, Model studies, Evaluation, Water pollution control, Law enforcement, Costs, Penalties(Legal), Management, Attitudes.
Identifiers: *Microeconomic decision model, Pollution control inducement, Corporate behavior.

The decision making process of firms engaged in potentially oil polluting activities is analyzed in an effort to isolate the effects of penalties and other pollution costs which may motivate pollution control. An economic decision model for oil pollution control strategy is developed on the basis of 1973 and 1974 data taken from the Coast Guard's Pollution Incident Reporting System. The model and analysis breakdown the major internal and external decision parameters and show the impact of civil penalties, cleanup costs, and internal costs on a firm's pollution control strategy. Civil penalties appear to be most effective in controlling minor spills, since the costs of product lost and expected cleanup are small relative to the penalties. As the spills increase in size, costs of cleanup and loss of product become much more important while the civil penalty becomes negligible. Cleanup costs have a significant impact on the decision in that they account for the largest portion of the external costs that the firm must internalize. However, application of the model to large scale spills reveals that the firm's internal costs have the largest influence on its pollution control strategy. This model may be extended into other areas such as fisheries enforcement, other forms of pollution control, and government intervention and regulation. (Luedtke-Wisconsin)
W77-02418

SALT MARSH ESTABLISHMENT AND DEVELOPMENT,
Environmental Concern, Inc., St. Michaels, Md.
For primary bibliographic entry see Field 4D.
W77-02420

ECONOMIC ANALYSIS OF EFFLUENT GUIDELINES: THE TEXTILES, FRICTION AND SEALING MATERIALS SEGMENT OF THE ASBESTOS MANUFACTURING INDUSTRY,
Little (Arthur D.), Inc., Cambridge, Mass.
S. V. Margolin, and B. U. N. Igwe.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-250 683, Price codes: A04 in paper copy, A01 in microfiche. Report No. EPA-230-2-74-030, July 1975. 72 p. 2 fig, 16 tab. 18, 68-01-1541.

Descriptors: *Economic impact, *Water pollution control, *Asbestos, *Standards, Sealants, Costs, Capital costs, Annual costs, Prices, Pricing, Employment, Foreign trade, Investment, Profits, Industrial plants, Industrial wastes, Industrial production, Pollution abatement.
Identifiers: *Asbestos manufacturing industry, *Effluent standards, Gaskets, Friction materials, Asbestos textiles.

This study supplements the EPA Effluent Limitations Guidelines analysis for the textiles, friction, and sealing materials segment of the asbestos product manufacturing industry by estimating the broader economic effects of the application of required effluent treatment technologies. None of the 75 plants in this segment of the industry was judged to be in danger of production curtailment or plant closure due to the imposition of the proposed standards. Only one sheet gaskets manufacturing plant is expected to incur additional costs ($80,300 incremental capital expenditures and annual water treatment costs of $35,500) to comply with the Best Practicable Technology standards. To meet the Best Available Technology (BAT) criteria, the above plant and four friction materials manufacturing plants are expected to incur total additional capital costs of $632,500 and annual water treatment costs of $139,200. No prices increases are predicted, with the exception of a 1% rise in the friction materials group as a result of BAT standards. Furthermore, no adverse impacts are expected on production and market growth or the historically favorable balance of payments position with respect to these products. 'New Source Performance Standards' are not expected to deter investments in new facilities. (Luedtke-Wisconsin)
W77-02422

ENERGY DEVELOPMENT: THE ENVIRONMENTAL TRADEOFFS. VOL. 2: RELATIVE ENVIRONMENTAL ASSESSMENT OF METHODS TO INCREASE ENERGY PRODUCTION, CRUDE OIL, PIPELINE QUALITY GAS, AND ELECTRICITY FROM WESTERN COAL,
Stanford Research Inst., Menlo Park, Calif.
For primary bibliographic entry see Field 6G.
W77-02423

ATLANTIC OFFSHORE OIL: THE NEED FOR PLANNING AND REGULATION,
Woods Hole Oceanographic Institution, Mass. Marine Policy and Ocean Management Program.
For primary bibliographic entry see Field 6G.
W77-02426

ENERGY FROM COAL.
Tetra Tech, Inc., Arlington, Va.
For primary bibliographic entry see Field 6D.
W77-02430

DEVELOPMENT DOCUMENT FOR EFFLUENT LIMITATIONS GUIDELINES AND NEW SOURCE PERFORMANCE STANDARDS FOR THE PHOSPHORUS DERIVED CHEMICALS SEGMENT OF THE PHOSPHATE MANUFACTURING POINT SOURCE CATEGORY,
Environmental Protection Agency, Washington, D.C. Effluent Guidelines Div.
E. E. Martin.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-241 018, Price codes: A08 in paper copy, A01 in microfiche. Report No. EPA-440/1-74-006-a, January 1974. 161 p. 12 fig., 20 tab., 73 ref.

Descriptors: *Standards, *Effluents, *Chemical industry, *Phosphorus compounds, *Technology, Recycling, Pollutants, Capital costs, Federal Water Pollution Control Act, Annual cost, Waste water treatment, Industrial wastes, Economic impact.
Identifiers: *Effluent guidelines, *Zero discharge, Phosphoric acid, Phosphorus pentoxide, Phosphorus pentasulfide, Sodium tripolyphosphate, Calcium phosphates, Ferrophosphorus, Phosphorus trichloride, Phosphorus oxychloride, Phosphate manufacturing industry.

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Effluent limitation guidelines and new source performance standards for the phosphate manufacturing industry to be achieved by July 1, 1977 and July 1, 1983 were developed. The phosphorus production subcategory of the industry is characterized by large quantities of raw process wastes, including highly deleterious phossy water and highly acidic scrubber and quenching waste waters. However, through the use of in-process and end-of-process controls, production plants currently demonstrate abatement practices resulting in 97% or greater reduction in the raw waste load before discharge, and the total recycle of process water without any discharge has been demonstrated using the best practicable control technology, essentially solving the most serious raw waste problem in the industry. The phosphorus-consuming subcategory, while consisting of essentially dry processes, uses water for air pollution abatement, cleaning and washing containers, and transferring the raw material, all resulting in acidic or phossy waste water. Sufficient reduction of effluents has not yet been achieved in this portion of the industry, but currently available technology exists to either recycle or neutralize and remove these wastes. Currently available practicable technology to achieve zero discharge also exists for the phosphate segment of the industry, though outside contamination may prevent reuse of food grade calcium phosphate waste waters. (Luedtke-Wisconsin)
W77-02431

ENVIRONMENTAL TRUST FUNDS: AN EVALUATION,
RIVUS, Inc., Glen Burnie, Md.
W. Smith, D. Hale, M. Rose, and J. Goldstein.
Available from the National Technicial Information Service, Springfield, VA 22161 as PB-251 306, Price codes: A06 in paper copy, A01 in microfiche. Report No. EPA-230/3-76-002-append. D, July 1974. 122 p. 9 fig., 34 ref., 2 append. 68-01-2462.

Descriptors: *Evaluation, *Financing, *Treatment facilities, *Sewage treatment, *Construction costs, Federal Water Pollution Control Act, Government finance, Economic efficiency, Pollution abatement, Equity, Economic feasibility, Income distribution.
Identifiers: *Trust funds, *Construction Grant Program, Financing alternatives.

Economic, fiscal legal, administrative, and institutional aspects of alternate financing arrangements for pollution abatement under the Federal Water Pollution Control Act Amendments are investigated, with particular emphasis on the utilization of trust funds. Six alternate financing arrangements for the Construction Grant Program are examined and three alternative arrangements are considered: earmarking benefit-related taxes, rate set by Congress; and earmarking benefit-related taxes, rate set by formula. In addition, the program's current financing arrangements and two unconventional options, open trust funds and off-budget financing, are illustrated. Evaluation criteria include efficiency, equity, income distribution, effectiveness, and feasibility. It is concluded that while the existing financial arrangement may be deficient in the economic efficiency and equity areas, it is effective in generating an adequate supply of funds. Its replacement by an environmental trust fund would not result in any net advantage; while it would offer a coherent framework for consideration of all program aspects under one title, it would also worsen certain economic effects of the program. If a trust fund arrangement were to be implemented, it may incorporate benefit-related taxes, have advantages from the standpoints of equity, income distribution, allocational efficiency, and use debt receipts to finance grants. (Luedtke-Wisconsin)
W77-02432

GROUNDWATER AND GROUNDWATER LAW IN MASSACHUSETTS.
Massachusetts Commonwealth Div. of Water Resources, Boston.
For primary bibliographic entry see Field 4B.
W77-02437

NITRATE REMOVAL FROM WATER AT THE WATER-MUD INTERFACE IN WETLANDS,
Louisiana Agricultural Experiment Station, Baton Rouge.
W. H. Patrick, Jr, R. D. Delaune, R. M. Engler, and S. Gotoh.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-253 791, Price codes: A05 in paper copy, A01 in microfiche. Report No. EPA-600/3-76-042, April 1976. 87 p. 25 fig., 5 tab., 22 ref. XH1627, R-800428.

Descriptors: *Nitrates, *Denitrification, *Wetlands, *Oxidation-reduction potential, Oxygen, *Mud-water interfaces, *Louisiana, Swamps, Salt marshes, Flooding, Rice, Manganese, Iron, Sulfur, Ammonia, Nutrient removal.

Flooded swamp and coastal marsh soils in Louisiana have a high capacity for nitrate reduction, according to research focused: (1) on learning how rapidly, how completely and by what mechanism nitrate is removed by biological reduction from shallow surface water in swamps, marshes and flooded soils, and (2) to determine the oxidation-reduction properties of the water-mud interface that control or influence the reduction of nitrate to nitrogen gas. Oxidized and reduced layers in flooded soil were differentiated according to the vertical distribution of the oxidation-reduction (redox) potential and concentrations of manganous manganese, ferrous iron, sulfide, nitrate and ammonium. Redox potential was measured with a special motor-driven assembly which pushed a platinum electrode through a soil sample at a steady rate. From laboratory experiments, it was found that nitrate added to shallow floodwater rapidly disappeared, oxygen loss from sediments occurred rapidly and nitrate reduction was not inhibited by up to 16 ppm oxygen dissolved in soil suspensions. The nitrate was not reduced in the floodwater but filtered downward into the anaerobic soil layer. Additions of organic matter to a mineral soil flood for rice culture decreased the thickness of the aerobic-anaerobic zone at the soil-water interface and increased the rate of nitrate reduction. (Harris-Wisconsin)
W77-02441

STUDIES ON LAKE RESTORATION BY PHOSPHORUS INACTIVATION,
Corvallis Environmental Research Lab., Oregon.
W. D. Sanville, A. R. Gahler, J. A. Searcy, and C. F. Powers.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-253 435, Price codes: A04 in paper copy, A01 in microfiche. Report No. EPA-600/3-76-041, April 1976. 53 p. 21 fig., 2 tab., 17 ref. 1BA608.

Descriptors: *Nutrient removal, *Sodium compounds, Lakes, Water quality, Phosphates, Chemicals, Chemical reactions, Phosphorus, Cyanophyta, Chlorophyta, Ammonia, Standing crops, Productivity, Iron, Manganese, Dissolved oxygen, Acidity.
Identifiers: *Lake restoration, *Nutrient inactivation, *Sodium aluminate, *Phosphorus inactivation, Cline's Pond(Or.), Kjeldahl nitrogen.

Sodium aluminate had at least partial effectiveness as an agent of nutrient inactivation in an attempt to control and reduce eutrophication of a farm pond, although firm conclusions about the effectiveness of the treatment could not be drawn because of a lack of uniformity of limnological parameters in the pond during the two-year period preceding the start of the experiment. Data was sought at Cline's Pond near Corvallis, Oregon on the ability of sodium aluminate to scavenge phosphate in the water column, to prevent resolubilization of phosphate and to inhibit primary production. In general, two years after inactivation there was a lessening of total phosphate, ammonia, total Kjeldahl nitrogen, iron, manganese and the algal standing crop. Other results were increased transparency, a more uniform distribution of dissolved oxygen and a shift in dominance from blue-green to green algae. The method seems promising for eutrophication reduction where the lake lacks significant flowthrough and where nutrient influx can be controlled. However, use of the technique must first be more fully evaluated because of short-comings in present knowledge about long-range environmental effects of sodium aluminate. (Harris-Wisconsin)
W77-02442

STRIP-MINING TECHNIQUES TO MINIMIZE ENVIRONMENTAL DAMAGE IN THE UPPER MISSOURI RIVER BASIN STATES,
Bureau of Mines, Denver, Colo. Intermountain Field Operation Center.
F. H. Persse
Available from the National Technical Information Service, Springfield, VA 22161 as PB-245 843, Price codes: A04 in paper copy, A01 in microfiche. Information Circular 8685, September 1975. 58 p. 11 fig., 9 tab., 18 ref., 3 append.

Descriptors: *Strip mines, *Land reclamation, Coals, Lignite, Equipment, Montana, North Dakota, Wyoming, Mining, Water pollution, Air pollution, Pollution abatement, Excavation, Costs, Land use, Geology, Climates, Revegetation, Environmental effects, Earth handling equipment, *Missouri River.
Identifiers: *Upper Missouri River Basin States

Geology, climate, and current land use information in the Upper Missouri River Basin are presented to assist strip mining and strip mining land reclamation operations. Proven methods of air and water pollution control and mined land restoration are described along with untried methods and equipment for land reclamation. The semi-arid climate of the Upper Missouri River Basin necessitates suppression of dust for the well-being of both men and machinery. However, current air pollution control methods are expected to satisfy these needs in most instances. The prevention of water pollution at coal and lignite operations generally would include diverting surface water from the working area without increasing sedimentation or dissolved salt content, measuring all water entering and leaving the mine area, and constructing a settling basin for mine water containing sediments, which are to flow into a water course. Reclamation of strip-mined land will require a greater annual expenditure than that for air or water pollution control. Unit reclamation costs for the thick deposits are expected to be less than in other parts of the nation. These costs are part of the production costs and should be borne by the ultimate consumer. (Luedtke-Wisconsin)
W77-02445

NATIONAL ENVIRONMENTAL STATISTICAL REPORT,
Mitre Corp., McLean, Va.
For primary bibliographic entry see Field 7C.
W77-02447

WATER HYACINTHS AND ALLIGATOR WEEDS FOR REMOVAL OF LEAD AND MERCURY FROM POLLUTED WATERS,
National Space Technology Labs., Bay St. Louis, Miss.
B. C. Wolverton, and R. C. McDonald
Available from the National Technical Information Service, Springfield, VA 22161 as N75 22937, Price codes: A02 in paper copy, A01 in microfiche. NASA TM-X-72723, April 1975. 12 p. 8 fig., 4 tab., 14 ref. RTOP 644-02-02.

Descriptors: *Alligatorweed, *Water hyacinth, *Water pollution control, *Heavy metals, Mercury, Lead, Metals, Toxicity, Water pollution sources, Absorption.

Alligator weeds and water hyacinths have demonstrated ability to rapidly absorb mercury and lead from rivers and distilled waters contaminated with these substances, raising the possibility that the method may be used as a means of controlling water pollution by toxic metals which, unlike most organic substances, are not degradable by natural processes. In a 24-hour period, water hyacinths in a laboratory experiment removed 0.176 mg of lead and 0.150 mg of mercury from a static water system per gram of dry plant material. During a similar period, alligator weeds removed 0.101 mg of lead per dry material gram, and reduced initial mercury levels of 0.875 ppm in river water and 0.920 ppm in distilled water below the detection limit of 1.0 ppb after six hours. Extrapolations of these results project a removal potentiality of 105.6 grams of lead and 90.0 grams of mercury per day with one hectare of water hyacinths, and a removal potentiality of 0.153 mg of mercury per gram of dry plant material with the alligator weeds in a six-hour period. The removal rate for the lead is projected on a basis of continual harvesting of the metal-saturated water hyacinths. Further research is in progress to evaluate the ability of the two plant species to remove other heavy metals as well as organic pollutants and nutrients. (Harris-Wisconsin)
W77-02450

NUTRITIONAL ECOLOGY OF NUISANCE AQUATIC PLANTS,
Wisconsin Univ., Madison. Dept. of Botany.
For primary bibliographic entry see Field 5C.
W77-02451

ELASTIC-PLASTIC STABILITY ANALYSIS OF MINE-WASTE EMBANKMENTS,
Bureau of Mines, Spokane, Wash. Spokane Mining Research Center.
For primary bibliographic entry see Field 8D.
W77-02502

USE OF PLANT PATHOGENS FOR BIOREGULATION OF AQUATIC MACROPHYTES,
Florida Univ., Gainesville. Dept. of Plant Pathology.
T. E. Freeman, R. Charudattan, and K. E. Conway.
In: Proceedings of a Symposium on Water Quality Management Through Biological Control, January 1975, p 20-23. 4 fig, 10 ref. OWRT A-027-FLA(7), 14-31-0001-5009.

Descriptors: *Biocontrol, Aquatic weeds, Plant pathology, *Aquatic weed control, Aquatic plants.
Identifiers: *Macrophytes, *Plant pathogen.

In a recent article in Weed Science enumerating the present status of projects on biological control of weeds in the United States and Canada, 75 plant species were listed as being under investigation as targets for biological control (Goeden et al. 1974). Out of this number, only five were included in programs investigating plant pathogens as biocontrol agents. Four out of the five were aquatic weeds under investigation at the University of Florida. Until the program was begun, surprisingly little consideration had been given plant pathogens as biological control agents for aquatic weeds. In fact, as pointed out in the review by Zettler and Freeman (1972) aside from some limited work in India conducted with PL 480 funds, all aspects of the study of diseases affecting aquatic plants had been virtually ignored. Certainly, aquatic plants are affected by diseases and, most certainly, plant pathogens have several desirable characteristics that make them ideal candidates for biological control agents. (Morgan-Florida)
W77-02514

ENVIRONMENT AND POLLUTIONS. SOURCES, HEALTH EFFECTS, MONITORING AND CONTROL,
F. Leh, K. V. Lak, and K. C. Richard.
Charles C. Thomas, Publishers: Springfield, Ill., 1974. 288 p, $14.75.

Descriptors: Environment, Water pollution, *Monitoring, Public health, Chemicals, Fertilizers, Air pollution, *Water quality standards, Pesticides, Industrial wastes, *Pollutant identification.

Global environmental problems are discussed and current information is reviewed in this monograph which is intended for college level students and researchers involved in environmental studies. The origins of current pollution problems are examined and followed by discussions on air pollution with topics on photochemical smog; sulfur compounds in the atmosphere; effects of air pollutants on vegetation, animals an man; global effects of air pollution; economic aspects of air poliffution; quantitative analysis of NO2, ozone, peroxyacyl nitrates, CO and hydrocarbons; and control of nitrogen oxides and sulfur emissions. The 2nd half of the text focuses on water pollution and covers: trace elements such as Hg, Pb, Cd, Co and Cu; pesticides and their biological effects; use of fertilizers; and determination of trace metals and organic chemicals. Removal of heavy metals, organic compounds, P and N are dealt with in the discussion on wastewater treatment. State air quality standards for gases, dusts and mists; maximum safe concentrations for trace metals; criteria for pesticides and herbicides in public water supplies; and, W H O standards in public water supplies are outlined in the appendices. Researchers, instructors and students will find this book valuable.--Copyright 1975, Biological Abstracts, Inc.
W77-02521

SOIL WARMING WITH POWER PLANT WASTE HEAT IN GREENHOUSES,
Oregon State Univ., Corvallis. Dept. of Soil Science.
L. Boersma, and K. A. Rykbost.
HortScience, Vol. 10(1), p. 28-30, February 1975. 3 tab, 9 ref. OWRT B-039-ORE(2).

Descriptors: *Soil temperature, *Heated water, Thermal pollution, Soil treatment.
Identifiers: Waste heat, *Soil warming.

A subsurface soil warming system consisting of parallel line heat sources, buried 52 cm deep and 122 cm apart, simulating a proposed arrangement for the use of power plant waste heat, was installed in a plastic covered greenhouse. Soil warming with a heat source temperature of about 36C increased soil temperatures substantially but had little effect on the air temperature.
W77-02526

EVALUATION OF CERCOSPORA RODMANII AS A BIOLOGICAL CONTROL OF WATERHYACINTHS,
Florida Univ., Gainesville. Dept. of Plant Pathology.
K. E. Conway.
Phytopathology, Vol. 66, No. 7, p 914-917, July 1976. 8 fig, 8 ref. OWRT A-033-FLA(1). 14-34-0001-7019.

Descriptors: *Biocontrol, Aquatic weeds, *Plant pathology, Waterhyacinth, *Aquatic weed control, *Florida, *Aquatic fungi, Reservoirs.
Identifiers: *Cercospora rodmanii, Rodman Reservoir(Fla).

A fungus, Cercospora rodmanii Conway, which was isolated from declining waterhyacinths in Rodman Reservoir in Florida, was evaluated for its biological control potential on waterhyacinths during two growing seasons (February-November). Results of greenhouse and field studies indicated that the fungus was responsible for the waterhyacinth decline. Infection was initiated on waterhyacinths in Lake Alice on the University of Florida campus during September and October, 1974. A combination of conidia and mycelia was applied to the plants. When the inoculum level was increased by a second similar spray application the disease spread rapidly. Browning of the waterhyacinths in the test pool was augmented in the later stages of the test by below-freezing temperatures. Cercospora rodmanii can be a virulent pathogen on waterhyacinth and its effect on field populations of waterhyacinth will be evaluated further to quantify damage to the plant. (Morgan-Florida)
W77-02528

OLD ANSWERS TO 'NEW' PROBLEMS: HENRY GEORGE, PROPERTY RIGHTS AND ENVIRONMENTAL QUALITY,
Clemson Univ., S.C.
For primary bibliographic entry see Field 6B.
W77-02539

CERCOSPORA RODMANII, A NEW PATHOGEN OF WATER HYACINTH WITH BIOLOGICAL CONTROL POTENTIAL,
Florida Univ., Gainesville. Dept. of Plant Pathology.
K. E. Conway.
Canadian Journal of Botany, Vol. 54, No. 10, p 1079-1083, 1976. 7 fig, 2 tab, 12 ref. OWRT A-027-FLA(9). 14-34-0001-6010.

Descriptors: *Biocontrol, *Florida, Reservoirs, Aquatic plants, *Water hyacinth, *Aquatic weed control.
Identifiers: *Cercospora rodmanii, *Pathogens.

A species of Cercospora was isolated from declining water hyacinths in the Rodman Reservoir in Florida. Differences between this isolate and a previously reported C. piaropi from water hyacinths and other morphologically similar species of Cercospora from other hosts warranted the establishment of a new species, C. rodmanii. Field evaluations of C. rodmanii indicate that it has biological-control potential for water hyacinth. (Morgan-Florida)
W77-02540

MYCOLEPTODISCUS TERRESTRIS LEAF SPOT ON WATERHYACINTH,
Florida Univ., Gainesville. Dept. of Plant Pathology.
R. Charudattan, and K. E. Conway.
Plant Disease Reporter, Vol 60, No 1, p 77-80. January, 1976. 1 fig, 10 ref. OWRT A-027-FLA(8). 14-34-0001-6010.

Descriptors: *Biocontrol, *Water hyacinth, Legumes, Root systems, Aquatic plants, Aquatic fungi.
Identifiers: *Mycoleptodiscus terrestris, *Leaf spots, *Plant pathogens.

Mycoleptodiscus terrestris, a root- and crown-rot organism on several legumes, is reported for the first time to cause a necrotic leaf spot on waterhyacinth (Eichhornia crassipes). In greenhouse tests, a suspension of conidia and mycelia of the organism sprayed on aerial parts caused spots on leaves of waterhyacinth, Capsicum annum, Glycine max, Lotus corniculatus, Lycopersicon esculentum, Melilotus alba, Phaseolus limensis, P. vulgaris, Pisum sativum, Trifolium incarnatum, and T. repens. In contrast, Arachis hypogaea, Cucumis sativus, Medicago sativa, Nicotiana tabacum, Trifolium hybridum, and T. pratense did not develop symptoms. Root discoloration and root rot occurred only on soil-inoculated legumes; crimson and white clovers were most susceptible. When waterhyacinth was floated in a suspension of conidia and mycelia, its roots or other parts were unaffected by the fungus. A mixture of ul-

traviolet and fluorescent lights induced profuse sporulation on potato-dextrose agar (PDA) cultures of M. terrestris. M. terrestris is not a virulent pathogen on waterhyacinth, but it may be a more ubiquitous pathogen than recognized. (Morgan-Florida)
W77-02543

THE EFFECT OF SELENITE ON THE PHYSIOLOGICAL AND MORPHOLOGICAL PROPERTIES OF THE BLUE-GREEN ALGA PHORMIDIUM LURIDUM VAR. OLIVACEA,
Medical Coll. of Ohio at Toledo. Dept. of Microbiology.
For primary bibliographic entry see Field 5C.
W77-02546

DEVELOPMENT DOCUMENT FOR EFFLUENT LIMITATIONS GUIDELINES AND NEW SOURCE PERFORMANCE STANDARDS FOR THE PLYWOOD, HARDBOARD AND WOOD PRESERVING SEGMENT OF THE TIMBER PRODUCTS PROCESSING POINT SOURCE CATEGORY,
Environmental Protection Agency, Washington, D. C. Effluent Guidelines Div.
R. E. Williams.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-240 811, Price codes: A15 in paper copy, A01 in microfiche. Report EPA-440/1-74-023a, April, 1974. 339 p, 45 fig, 148 ref, 72 tab.

Descriptors: *Waste water treatment, *Water pollution treatment, *Water quality standards, Wastes, Industrial wastes, Water pollution sources, Water pollution, Water pollution control, Water quality control, Waste treatment, Regulation, Effluents, Lumber, Preservation, Water quality.
Identifiers: *Forest products industry, Plywood, Hardboards, Barking, Veneer.

Findings are presented of a study of the plywood, hardboard, and wood preserving segment of the timber products processing industry for the purpose of developing effluent limitation guidelines for existing plants and standards for new plants. The plywood, hardboard, and wood preserving segment of the industry was divided into 8 subcategories based primarily on distinctions generated from differences in the type of product manufactured and the specific processes involved. Best practicable control technology currently available for six of the subcategories was determined to be no discharge of process waste water pollutants into navigable waters. These subcategories include barking, veneer, plywood, hardboard (dry process), wood preserving, and wood preserving (boultonizing). Discharges are allowed for hydraulic barking operations and direct steam conditioning in the veneer manufacturing operations. Quantitative limitations are determined for the hardboard (wet process) and the wood preserving (steam conditioning) subcategories. The new source performance standards for the 6 subcategories is no discharge of pollutants into navigable waters. A discharge is allowed for effluents from hydraulic barking operations. With pretreatment, effluents from these segments of the wood processing industry can be discharged into publically owned waste water treatment plants. (Witt-IPC)
W77-02554

THE USE OF TENAX FOR THE EXTRACTION OF PESTICIDES AND POLYCHLORINATED BIPHENYLS FROM WATER. II. TESTS WITH ARTIFICIALLY POLLUTED AND NATURAL WATERS,
Rome Univ. (Italy).
V. Leoni, G. Puccetti, R. J. Colombo, and A. M. D'Ovidio.
Journal of Chromatography, Vol. 125, No. 2, p 399-407, October 13, 1976. 1 fig, 22 ref, 5 tab.

Descriptors: *Water analysis, *Pollutant identification, *Polychlorinated biphenyls, *Pesticides, *Separation techniques, Trace elements, Water pollution sources, Water chemistry, Filtration, Suspended solids, Wastes, Analytical techniques.
Identifiers: *Tenax.

The application of Tenax to the extraction of organic micropollutants such as pesticides and polychlorobiphenyls from waters has been studied. It was observed that in the presence of other pollutants (oil, surface-active substances, etc.) the results obtained with an absorption column of Tenax-Celite are equivalent to those obtained with the continuous liquid-liquid extraction technique. For natural waters that contain solids in suspension that absorb pesticides, it may be necessary to filter the water before extraction with Tenax and then to extract the suspended solids separately. Analyses of river and estuarine sea waters, filtered before extraction, showed the effectiveness of Tenax, and the extracts obtained for the pesticide analysis proved to be less contaminated by interfering substances than the corresponding extracts obtained by the liquid-liquid technique. (Witt-IPC)
W77-02561

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

UTILITY OF URBAN RUNOFF MODELING, (PROCEEDINGS OF A SPECIAL SESSION, SPRING ANNUAL MEETING, AMERICAN GEOPHYSICAL UNION, WASHINGTON, D.C. 14 APRIL 1976.
American Society of Civil Engineers, New York.
For primary bibliographic entry see Field 2A.
W77-02076

MATHEMATICAL MODELS FOR USE IN PLANNING REGIONAL WATER RESOURCES AND ENERGY SYSTEMS,
Illinois Univ. at Urbana-Champaign. Dept. of Civil Engineering.
E. D. Brill, Jr, S. G. Velioglu, and R. W. Fuessle.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 364, Price codes: A05 in paper copy, A01 in microfiche. Illinois Water Resources Center, Urbana, Research Report No. 116, November 1976, 87 p, 9 fig, 54 ref, 10 tab, 2 append. OWRT B-092-Ill(1).

Descriptors: *Energy, Natural resources, *Optimization, *Planning, *Powerplants, *Regional development, *Systems analysis, *Water resources development, *Mathematical models, Water demand, Alternative planning, Water allocation(Policy).
Identifiers: Coal conversion facilities.

Existing and projected energy facilities will, in the near future, place major demands on the country's water resources. These demands compete with many other uses of the resources, including municipal and industrial uses, navigation, irrigation, and water quality maintenance. The possible development of coal conversion facilities presents another potential water demand. Complex public sector problems such as: (1) the extent and development of coal conversion capacity, (2) interbasin transfer of water, (3) cooling technologies for large energy facilities, (4) diversion of Lake Michigan water, and (5) allowable withdrawal and consumptive uses of river water, all arise from the interlocking nature of the water resources-energy system. Although mathematical models cannot solve these problems directly, they can be useful in gaining insight into major issues associated with policy alternatives. With the aid of such models, quantitative trends such as costs and water development patterns associated with each decision alternative can be more readily identified. Mathematical models are presented for use in planning a regional allocation of water for energy facilities as well as for other water uses. These models include components for the interrelated water and energy subsystems. The use of these models in conjunction with other existing models in order to provide a better picture of the overall system is discussed. Since the models use widely available computer codes, they are practical and easy to utilize.
W77-02079

METHODS FOR DETERMINING RECREATIONAL, ENVIRONMENTAL, AND ECONOMIC CONSEQUENCES OF ALTERNATIVE DEVELOPMENT PROGRAMS FOR THE BEAR LAKE AREA,
Utah State Univ., Logan. Dept. of Forestry and Outdoor Recreation.
For primary bibliographic entry see Field 6B.
W77-02082

METARATIONALITY IN BENEFIT-COST ANALYSES,
Louisville Univ., Ky. Systems Science Center
For primary bibliographic entry see Field 6B
W77-02123

ON THE INCOME DISTRIBUTIONAL EFFECTS OF ENVIRONMENTAL MANAGEMENT POLICIES,
British Columbia Univ., Vancouver. Dept of Economics.
For primary bibliographic entry see Field 5G.
W77-02124

OPERATION OF A RESERVOIR COLLECTING WATER FROM A SMALL WATERSHED,
Technion - Israel Inst of Tech., Haifa Lowdermilk Faculty of Agricultural Engineering.
For primary bibliographic entry see Field 4A.
W77-02126

A BIOECONOMIC SIMULATION ANALYSIS OF REGULATING GROUNDWATER IRRIGATION,
Oklahoma State Univ., Stillwater. Dept of Agricultural Economics.
For primary bibliographic entry see Field 3F.
W77-02549

6B. Evaluation Process

PROBLEM IDENTIFICATION AND RANKING, A SELECTED REVIEW OF TECHNIQUES USED BY PUBLIC AGENCIES,
Illinois Univ. at Urbana-Champaign. Dept. of Urban and Regional Planning.
A. Harris, L. F. Blair, W. T. Lamm, H. Felstehausen, and T. A. Austin
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 391, Price codes: A06 in paper copy, A01 in microfiche. Water Resources Research Center, University of Minnesota, Regional Research Series Number 1, Sept. 1976, 104 p. OWRT B-057-IA(1).

Descriptors: *Planning, *Mississippi River basin, *Research priorities, Administrative agencies, Federal government, State governments, Governmental interrelations.
Identifiers: Upper Mississippi River basin.

Three aspects of water and related land resource problem identification and ranking procedures are investigated: (1) past approaches to problem identification and ranking in the Upper Mississippi River basin; (2) an overview of present identification/ranking activities in eight selected agencies and governmental levels; and (3) a detailed investigation of identification/ranking procedures as developed within a single federal agency.

W77-02080

METHODS FOR DETERMINING RECREATIONAL, ENVIRONMENTAL, AND ECONOMIC CONSEQUENCES OF ALTERNATIVE DEVELOPMENT PROGRAMS FOR THE BEAR LAKE AREA,
Utah State Univ., Logan. Dept. of Forestry and Outdoor Recreation.
J. F. Hoagland, D. C. Iverson, and L. S. Davis.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 433, Price codes: A12 in paper copy, A01 in microfiche. June 1976. 248 p, 7 fig, 37 tab, 50 ref, 8 append. OWRT A-026-UTAH(1). 14-34-0001-6046.

Descriptors: Planning, *Environmental effects, *Recreation, Programs, Utah, Idaho, Methodology, Lakes, Model studies, *Economic impact, *Alternative planning, Decision making, Cost-benefit analysis, *Input-output analysis.
Identifiers: *Bear Lake area(Utah-Idaho).

An attempt is made to provide the natural resource planner and decision maker with a practical methodology for evaluating the quantitative and qualitative aspects of recreation opportunity for alternative land and water resource development plans. Two linked models comprise the methodology used (initiated at Bear Lake which borders Utah and Idaho). The first model estimates the maximum carrying capacity of a water resource system for recreation activities. The output of this model is a listing of the maximum kinds, amounts and quality of recreation activity that can be performed in different seasons and in different sectors of the resource. The second model considers the limitations of access, facilities, budgets and policy in determining the mix of recreation opportunities which can be effectively supplied. This model is formulated as a linear programming problem and provides as output a list of the kinds and amounts of recreation opportunity that can actually be supplied. The approach developed here provides a link between the socio-economic and biological aspects of resource decision making. It is a supply-oriented approach which establishes a resource's physcical recreation carrying capacity and then, in light of various economic, political, social and administrative constraints, provides the planner with a view which may help make a rational decision.
W77-02082

METARATIONALITY IN BENEFIT-COST ANALYSES,
Louisville Univ., Ky. Systems Science Center.
R. K. Ragade, K. W. Hipel, and T. E. Unny.
Water Resources Research, Vol. 12, No. 5, p 1069-1076, October 1976. 8 tab, 10 ref.

Descriptors: *Water resources, *Management, *Methodology, *Cost-benefit analysis, Optimization, River basin development, Fishing, Projects, Decision making, Equations, Mathematical models, Systems analysis.
Identifiers: *Metarationality, Pseudo-Boolean functions, *Metagame analysis.

In water resources management, intangibles and multiple decision criteria exist as a result of various multipurpose needs. This paper presents a type of benefit-cost analysis which is capable of handling both quantitative and intangible benefits and costs. Using this methodology, it is possible for each interest group to assign values to benefits and costs according to what the group thinks is correct. Linguistic descriptions are sufficient for the intangibles. The method is based upon the theory of metarationality, and it is shown how pseudo-Boolean functions can be used to define the concepts of metarationality and also to record preferences of the parties involved in an analysis. In an example, the preferences of two nations involved in a fishing dispute are recorded using the pseudo-Boolean functions. The methodology is applied to a hypothetical river basin problem. (Bell-Cornell)
W77-02123

SWIMMING PARTICIPATION AND WATER QUALITY IN TOMPKINS COUNTY, NEW YORK,
Cornell Univ., Ithaca, N. Y. Dept. of Natural Resources.
For primary bibliographic entry see Field 5G.
W77-02185

PHYSICAL AND ECONOMIC EFFECTS ON THE LOCAL AGRICULTURAL ECONOMY OF WATER TRANSFER TO CITIES,
Economic Research Service, Fort Collins, Colo. Natural Resource Economics Div.
R. L. Anderson, N. I. Wengert, R. D. Heil, D. Williams, and C. Palmer.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 359, Price codes: A04 in paper copy, A01 in microfiche. Colorado Environmental Resources Center Fort Collins, Completion Report Series No. 75, October 1976. 48 p, 6 fig, 35 tab, append. OWRT A-027-COLO(1). 14-31-0001-5006.

Descriptors: Input-output analysis, Institutional constraints, Income, *Irrigation, Municipal water, Water rights, Cities, *Colorado, Water supply, Urbanization, *Economic impact, Agriculture, *Water transfer, *Suburban areas, *Condemnation, Legal aspects.
Identifiers: Colorado front range.

Rapid suburban growth north of Denver, Colorado has caused developing communities to expand their municipal water systems. In order to obtain additional water supplies, the cities of Thornton and Westminster have initiated condemnation suits against three irrigation companies to obtain their water rights. The three irrigation companies have a service area of about 40,000 acres--30,000 are currently irrigated. Of this land, 80 percent is class II and III, the highest classes found in Colorado. Approximately 400 farms and small tracts receive water from these companies--200 are commercial farms. Total agricultural production from the irrigated lands is about $8 million per year. Economic input-output analysis shows that irrigated agriculture contributes 561 jobs to the economy and over $4 million in net income. The cities and irrigation companies should work together to develop joint use of water rather than drying up irrigated lands for municipal water supply.
W77-02190

PROCEEDINGS: 8TH ANNUAL WATER RESOURCES SEMINAR GROUNDWATER RESOURCES AND DEVELOPMENT NOVEMBER 24 AND 25, 1975.
Minnesota Univ., Minneapolis. Water Resources Research Center.
For primary bibliographic entry see Field 4B.
W77-02223

ECONOMIC ANALYSIS OF EFFLUENT GUIDELINES: CANE SUGAR REFINING,
Development Planning and Research Associates, Inc., Manhattan, Kans.
For primary bibliographic entry see Field 5D.
W77-02414

DEVELOPMENT DOCUMENT FOR EFFLUENT LIMITATIONS GUIDELINES AND NEW SOURCE PERFORMANCE STANDARDS FOR THE FABRICATED AND RECLAIMED RUBBER SEGMENT OF THE RUBBER PROCESSING POINT SOURCE CATEGORY,
Environmental Protection Agency, Washington, D. C. Effluent Guidelines Div.
For primary bibliographic entry see Field 5D.
W77-02415

ECONOMIC EFFECTS OF ENFORCEMENT VARIABLES ON COMMERCIAL OIL POLLUTION CONTROL STRATEGY,
Naval Postgraduate School, Monterey, Calif.
For primary bibliographic entry see Field 5G.
W77-02418

DEVELOPMENT DOCUMENT FOR EFFLUENT LIMITATIONS GUIDELINES AND NEW SOURCE PERFORMANCE STANDARDS FOR THE FORMULATED FERTILIZER SEGMENT OF THE FERTILIZER MANUFACTURING, POINT SOURCE CATEGORY,
Environmental Protection Agency, Washington, D.C. Effluent Guidelines Div.
For primary bibliographic entry see Field 5D.
W77-02419

DEVELOPMENT DOCUMENT FOR EFFLUENT LIMITATIONS GUIDELINES AND NEW SOURCE PERFORMANCE STANDARDS FOR THE PRIMARY ALUMINUM SMELTING SUBCATEGORY OF THE ALUMINUM SEGMENT OF THE NONFERROUS METALS MANUFACTURING, POINT SOURCE CATEGORY,
Environmental Protection Agency, Washington, D. C. Effluent Guidelines Div.
For primary bibliographic entry see Field 5D.
W77-02421

ECONOMIC ANALYSIS OF EFFLUENT GUIDELINES: THE TEXTILES, FRICTION AND SEALING MATERIALS SEGMENT OF THE ASBESTOS MANUFACTURING INDUSTRY,
Little (Arthur D.), Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5G.
W77-02422

ECONOMIC AND ENVIRONMENTAL IMPACTS OF AGRICULTURAL LAND DRAINAGE IN ONTARIO,
York Univ., Downsview (Ontario). Dept. of Geography.
For primary bibliographic entry see Field 4A.
W77-02425

ENERGY FROM COAL.
Tetra Tech, Inc., Arlington, Va.
For primary bibliographic entry see Field 6D.
W77-02430

ECONOMIC ANALYSIS OF EFFLUENT GUIDELINES FOR SEAFOOD PROCESSING INDUSTRY: (FISH MEAL, SALMON, BOTTOM FISH, CLAMS, OYSTERS, SARDINES, SCALLOPS, HERRING, ABALONE),
Development Planning and Research Associates, Inc., Manhattan, Kans.
For primary bibliographic entry see Field 5D.
W77-02433

ECONOMIC ANALYSIS OF EFFLUENT GUIDELINES: BEET SUGAR INDUSTRY,
Development Planning and Research Associates, Inc., Manhattan, Kans.
For primary bibliographic entry see Field 5D.
W77-02434

PRINCIPLES OF DETERMINING A SOCIAL DISCOUNT RATE,
Rutgers - The State Univ., New Brunswick, N. J. Water Resources Research Inst.
W. Whipple, Jr.
Water Resources Bulletin, Vol 11, No 4, p 811-819, August 1975. 2 fig, 20 ref. OWRT A-048-NJ(1).

Descriptors: Cost-benefit analysis, *Interest, *Discount rate, Economics, Risks, Taxes, Infla-

tion(Economic), Government supports, Cost analysis, US Water Resources Council.
Identifiers: *Opportunity cost theory.

An analysis is made of theories of determining government interest and discount rates. It is found that generally favored opportunity cost theories must now be reconsidered in the light of the chronic currency depreciation of the present era, and a less optimistic viewpoint as to the future. On account of our tax structure, the reconciliation between alternative theories depends upon the social evaluation of the corporate income tax. If this tax is construed as being socially desirable, it seems that our current discount rates should be reduced to perhaps 5%, as long as future benefits are to be evaluated in terms of present day prices.
W77-02518

OLD ANSWERS TO 'NEW' PROBLEMS: HENRY GEORGE, PROPERTY RIGHTS AND ENVIRONMENTAL QUALITY,
Clemson Univ., S.C.
B. Yandle, and A. H. Barnett.
Journal of Economics and Sociology, Vol. 33, No. 4, p 393-400, October 1974. S-038-SC.

Descriptors: *Economics, *Resource allocation, *Management, Economic rent, Decision making, Public rights, Equity, Income distribution, Economic efficiency, *Water quality
Identifiers: *Property rights, Externalities.

Some of the implicit assumptions in several of the major economic proposals for water quality management are considered. These are compared to the assumption made by Henry George in his analysis of property rights in land. The Georgian management scheme is then analyzed in light of current proposals and George's contributions are evaluated.
W77-02539

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

PROSPECTS FOR AN AGRO-INDUSTRIAL COMPLEX ON THE GAZA-SINAI SEA COAST,
State Univ. of New York at Buffalo.
For primary bibliographic entry see Field 3A
W77-02115

MINIMIZING COSTS IN WELL FIELD DESIGN IN RELATION TO AQUIFER MODELS,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources
For primary bibliographic entry see Field 8B.
W77-02161

THE ECONOMICS OF PRESSURIZED IRRIGATION SYSTEMS FOR MATURE CITRUS ORCHARDS IN SOUTHWESTERN ARIZONA,
Arizona Univ., Tucson. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 3F.
W77-02165

RATIONAL WATER PRICING IN THE TUCSON BASIN,
Arizona Univ., Tucson. Coll. of Business and Public Administration.
For primary bibliographic entry see Field 6D.
W77-02170

PRICING URBAN WATER,
Arizona Univ., Tucson. Coll. of Business and Public Administration.
For primary bibliographic entry see Field 6D.
W77-02171

A COMPREHENSIVE SYSTEMS ENGINEERING STUDY OF THE TRUE ECONOMIC VALUE OF UNPOLLUTED WATER VERSUS VARYING DEGREES OF POLLUTED WATER,
Rhode Island Univ., Kingston. Dept. of Mechanical Engineering and Applied Mechanics.
For primary bibliographic entry see Field 5G.
W77-02220

ECONOMIC IMPACTS OF WEATHER VARIABILITY,
Missouri Univ., Columbia. Dept. of Atmospheric Science.
For primary bibliographic entry see Field 3B.
W77-02429

ENVIRONMENTAL TRUST FUNDS: AN EVALUATION,
RIVUS, Inc., Glen Burnie, Md
For primary bibliographic entry see Field 5G.
W77-02432

6D. Water Demand

MATHEMATICAL MODELS FOR USE IN PLANNING REGIONAL WATER RESOURCES AND ENERGY SYSTEMS,
Illinois Univ. at Urbana-Champaign. Dept. of Civil Engineering
For primary bibliographic entry see Field 6A
W77-02079

THE ARIZONA WATER PLAN: A STATUS REPORT,
Arizona Water Commission, Phoenix.
For primary bibliographic entry see Field 4D
W77-02104

WATER USE IMPLICATIONS FOR NUCLEAR POWER STATIONS IN THE UNITED STATES OF AMERICA,
Columbia Univ., New York
For primary bibliographic entry see Field 6G
W77-02114

WATER REQUIREMENTS FOR SOLAR ENERGY,
Arizona State Univ., Tempe
For primary bibliographic entry see Field 3E.
W77-02122

THE COPPER INDUSTRY AND WATER IN ARIZONA,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 3E.
W77-02166

RATIONAL WATER PRICING IN THE TUCSON BASIN,
Arizona Univ., Tucson. Coll. of Business and Public Administration.
J. L. Barr, and D. E. Pingry.
Arizona Review, Vol. 25, No. 10, p 1-11, October, 1976. 2 fig, 4 tab, 7 ref.

Descriptors: *Water rates, *Competing uses, *Water management(Applied), *Water costs, *Water consumption, *Water demand, Water supply, Water shortage, Water utilization, Water policy, Water allocation(Policy), *Arizona, Irrigation, Social impact, Industrial water, Water table, Water sources, Recharge.
Identifiers: *Tucson basin(Ariz).

Man-made water demands for urban use, crop cultivation and industrial activitity can disrupt the rainfall runoff supply of water, causing shortages. If the supply of water is not completely renewable, today's consumption impinges on the amount available in the future. A low price encourages consumption. This article discusses rational water pricing and the problem of allocating water efficiently in the Tucson Basin. Any solution to the problem will require better public understanding and some type of water conservation. The city of Tucson, agriculture, and copper mines all share the water available in the Basin, so that control of all three user types is required. It is concluded that it is cheaper to conserve water than report it from other areas, that water is seriously underpriced in Tucson, and there should be an increase in water rates. Scarcity pricing will discourage urban growth, industrial use and crop cultivation, but crop cultivation will be affected most severely. (Jamail-Arizona)
W77-02170

PRICING URBAN WATER,
Arizona Univ., Tucson. Coll. of Business and Public Administration.
J. T. Wenders
Arizona Review, Vol. 25, No. 10, p 13-21, October, 1976. 1 fig, 12 ref.

Descriptors: *Water demand, *Water rates, *Water supply, *Water policy, *Water costs, Competing uses, Water allocation(Policy), Water zoning, Water shortage, Water users, Water resources development, Water management(Applied), Water consumption, *Arizona.
Identifiers: *Tucson(Ariz).

Water demand, rates, cost allocation and overall water policy in Tucson are evaluated. The term water 'needs' implies that there are no trade-offs between water and other resources. It is contended that if water were delivered at a higher price, then people would be more concerned with conservation. The optimal level of water usage and peak and off-peak incremental costs are discussed. The authors argue against political rate making and in favor of peak load pricing that would charge higher rates for water used during the peak times of the year and of the day. It is concluded that (1) a scarcity price must be set on water and charged in addition to delivery costs; (2) seasonal, lifting, and distance price differentials based upon incremental costs must be established, and (3) the public has become accustomed to water rates which have been too low. (Jamail-Arizona)
W77-02171

HYDROLOGY OF LAKE COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla. Water Resources Div.
For primary bibliographic entry see Field 4B
W77-02316

WATER RESOURCES INFORMATION NEEDS FOR THE SUWANNEE RIVER WATER MANAGEMENT DISTRICT,
Geological Survey, Tallahassee, Fla. Water Resources Div.
For primary bibliographic entry see Field 4A
W77-02318

ENERGY FROM COAL.
Tetra Tech, Inc., Arlington, Va.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 Price $2.05. Report No. ERDA 76-67, 1976. 124 p, 39 fig, 3 tab, 159 ref. E(49-18)-2225.

Descriptors: *Energy, *Coals, Bibliographies, Economics, Social aspects, Legislation, Coal mines, Coal mine wastes, Land reclamation, Mining, Transportation, Reviews
Identifiers: Coal gasification, Coal liquefaction, Coal preparation

An overview of coal as an energy source is presented. Major aspects considered were: coal

pply and demand, classification of coal, mining chnology including land reclamation, coal transrtation and storage, coal preparation, coal ocess technology, economic considerations, and gislative policy. Short bibliographies follow scussion of each aspect. While the United States s more energy available in the form of coal than the combined resources of petroleum, natural s, oil shale, and tar sands, this solid fuel can curntly be applied to only a limited portion of the tal national energy demand; primarily that of the ectric utilities. Consequently, converting coal to seous and liquid fuels in commercial quantities necessary in order to make it available to energy ers in the transportation, household, and comercial sectors. Coal gasification and liquefaction ocesses are emphasized in the report. Progress resolving technical and social problems related the use of coal, such as land reclamation of ined land and health hazards, is described. Lack sufficient capital and the related concerns of anpower, equipment, and transportation is a rious constraint on expansion of the industry's arket. (Luedtke-Wisconsin)
77-02430

E. Water Law and Institutions

ROBLEM IDENTIFICATION AND RANKING, SELECTED REVIEW OF TECHNIQUES SED BY PUBLIC AGENCIES,
inois Univ. at Urbana-Champaign. Dept. of rban and Regional Planning.
r primary bibliographic entry see Field 6B.
77-02080

AW, HYDROLOGY, AND SURFACE-WATER PPLY IN THE UPPER COLORADO RIVER ASIN,
mont-Doherty Geological Observatory, lisades, N. Y.
C. Jacoby, Jr., G. D. Weatherford, and J. W. egner.
ater Resources Bulletin, Vol. 12, No. 5 p 973-4, October, 1976. 4 fig, 24 ref.

escriptors: *Colorado River Basin, *Water sources development, *Colorado River Comct, *Water law, Legal aspects, Hydrology, ater supply, Surface waters, River basin velopment, Water resources, Water Allocan(Policy), Water demand, Streamflow, Water licy, Groundwater, Boulder Canyon Project t, Colorado River, Dendrochronology.
entifiers: Central Arizona Project.

e relationship between law and hydrology in ter resources development is discussed. Law atnpts to allocate a limited and valuable resource ile hydrology tries to define the limits of the ource. In the past an inadequate data base has de hydrologic estimates difficult and political tors pushed the law into possibly conflicting nmitments in the Colorado River Basin. The ter allocation process and the role of hydrology lefining the risk of deficiency are described and istorical overview of the interaction between and hydrology is presented. Using tree-ring earch, hydrologists have produced a more inite data base and thus given legal policy kers more reliable information. As developnt approaches the resource limit in the Upper lorado River Basin, lawyers and hydrologists st act in concert toward the equitable solution allocation and reallocation problems. (Jamailzona)
7-02119

PERTS CLING TO WATER MYTHS,
primary bibliographic entry see Field 3F.
7-02120

PHYSICAL AND ECONOMIC EFFECTS ON THE LOCAL AGRICULTURAL ECONOMY OF WATER TRANSFER TO CITIES,
Economic Research Service, Fort Collins, Colo. Natural Resource Economics Div.
For primary bibliographic entry see Field 6B.
W77-02190

INTERNATIONAL SEABED REGIME: INDIA'S INTERESTS AND POLICY OPTIONS,
Lucknow Univ. (India).
M. Shyam, and S. Sunder.
Indian Political Science Review, Vol. 10, No. 1, p. 1-18, 1976.

Descriptors: *Law of the sea, *Oceans, *Mining, *India, Copper, Nickel, Regulation, Cobalt, Manganese, International waters, International law, Governments, Jurisdiction, Economic impact.
Identifiers: *Seabed mining, *Manganese nodules.

India's alternatives with respect to the development of a regime to govern the exploitation of the seabed resources beyond national jurisdictions are discussed, taking into account potential future discoveries and technological breakthroughs as well as known resources. Manganese nodules, containing copper, nickel, cobalt, and possible manganese, are the most promising known resources of the seabed. India's manganese exports are likely to be hurt by seabed production but India may benefit from lower prices of copper, nickel, and cobalt. Besides these direct economic effects, India's policy toward a new seabed regime should consider such factors as preventing of a new form of colonial competition over the seabed, Indian access to seabed technology and research results, securement of her fair share of the wealth of the seas, and prevention of ecological damage to the oceans. Examination of three major policy options indicates that a strong international agency with regulatory authority would best suit India's interests, as opposed to a continuation of the status quo (no international agency) or establishment of a weak agency restricted to registry functions. (Luedtke-Wisconsin)
W77-02424

ATLANTIC OFFSHORE OIL: THE NEED FOR PLANNING AND REGULATION,
Woods Hole Oceanographic Institution, Mass. Marine Policy and Ocean Management Program.
For primary bibliographic entry see Field 6G.
W77-02426

THE FLOOD DISASTER PROTECTION ACT OF 1973,
Pennsylvania State Univ., University Park. Dept. of Business Law.
For primary bibliographic entry see Field 6F.
W77-02427

MINNESOTA WATER RESOURCES BOARD AND WATERSHED DISTRICTS.
Minnesota Water Resources Board, St. Paul.
Legislative Report 1974. 48 p. 2 fig, 6 append.

Descriptors: *Minnesota, *Watershed management, *State governments, *Legislation, Judicial decisions, Local governments, Water management(Applied), Costs, Water resources development.
Identifiers: *Watershed districts, Minnesota Watershed Act, Minnesota Water Resources Board.

The course of Minnesota water resources management activities under the auspices of that state's Water Resources Board and the Watershed Act is summarized. Minnesota Statutes, Sections 105.71-105.79 and 112.34-112.86 (1955, 1975) called for the establishment of individual watersheds with authority vested in local units, and created the Water Resources Board to perform as a quasi-judicial body for the establishment and general supervision of the watershed districts as well as resolving water policy questions between state departments or individuals and a state department. By 1973, 34 watershed districts were established, and the constitutionality of the Act as well as Board decisions have been affirmed in court. A tabulation of these judicial decisions is appended. Brief summaries of each of the 34 water district's problems and projects are included, along with a cost breakdown of individual projects or improvements. Overall, a grand total of $64,676,974 has been expended, over 80% of which has come from federal sources. It is concluded that this system is accomplishing its legislative intent, but that the procedure for resolving conflicts is underutilized because agencies and individuals seem unaware of the opportunities provided by the legislation. (Luedtke-Wisconsin)
W77-02428

GROUNDWATER AND GROUNDWATER LAW IN MASSACHUSETTS.
Massachusetts Commonwealth Div. of Water Resources, Boston.
For primary bibliographic entry see Field 4B.
W77-02437

PRINCIPLES OF DETERMINING A SOCIAL DISCOUNT RATE,
Rutgers - The State Univ., New Brunswick, N. J. Water Resources Research Inst.
For primary bibliographic entry see Field 6B.
W77-02518

6F. Nonstructural Alternatives

THE FLOOD DISASTER PROTECTION ACT OF 1973,
Pennsylvania State Univ., University Park. Dept. of Business Law.
B. L. Myers.
American Business Law Journal, Vol 13, p 315-333, 1976. 17 ref.

Descriptors: *Flood plain insurance, *Flood plain zoning, Non-structural alternatives, Flood protection, Floodproofing, Land use, Building codes, Design standards, Regulation, Federal government, Local governments, Legislation, Insurance, Costs, Compensation.
Identifiers: *Flood Disaster Protection Act of 1973.

The background, requirements and implications of the Flood Disaster Protection Act of 1973, the latest amendment to the National Flood Insurance Act of 1968, are discussed. Basically the 1973 amendment is an attempt to overcome the problems posed in the 1968 Act by: (1) substantially increasing the limits of flood insurance coverage available to property owners, (2) rapidly identifying all flood-prone communities and requiring them to participate in the flood insurance program, and (3) requiring virtually all new construction and new property owners in flood zones to be covered by flood insurance. It requires flood insurance as a prerequisite to obtaining federal mortgage money or mortgage money from a federally insured or related lending institution. As such, it will likely establish a new vista in federal land use control, by bringing nearly seven per cent of the land in the United States under federal regulations. If a community refuses to participate in the HUD administered program, virtually all sources of funds for flood plain development would be eliminated, present owners will be unable to purchase insurance, but the federal government will continue to provide disaster relief. If a community participates, all structures in the flood plain would be elevated above the 100-year flood level or floodproofed to that level. (Luedtke-Wisconsin)
W77-02427

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6G. Ecologic Impact Of Water Development

EVALUATION OF ESTUARINE SITE DEVELOPMENT LAGOONS,
Cook Coll., New Brunswick, N.J.
For primary bibliographic entry see Field 5G.
W77-02088

WATER USE IMPLICATIONS FOR NUCLEAR POWER STATIONS IN THE UNITED STATES OF AMERICA,
Columbia Univ., New York.
G. J. Halasi-Kun.
Nordic Hydrology, Vol. 6, No. 1, p 1-13, 1975. 6 fig, 1 tab, 12 ref.

Descriptors: *Nuclear powerplants, *Water requirements, *Water consumption(Except consumptive use), *Water demand, *Thermal pollution, Nuclear energy, Water utilization, Nuclear reactors, Water cooling, Environmental effects, Water pollution, Heated water, Water pollution sources, Water temperature, Water supply, Available water, Cooling towers, United States.

The location of nuclear powerplants must be considered in relation to their total environment. The problems in selecting reactor sites are discussed in terms of population density, coolant water demand, thermal pollution, and engineered safeguard measures during construction and operation. The coolant water demand is a major problem in selecting a reactor site. The critical period for water consumption is the late, hot summer. This generally coincides with the lowest surface flow and the highest period of fresh water demand. Because of the possibility of water shortages in some areas of the United States, especially in arid areas, increasing consideration is being given to the use of dry cooling towers for waste rejection and to improving efficiency of existing and planned reactors. (Jamail-Arizona)
W77-02114

ON THE INCOME DISTRIBUTIONAL EFFECTS OF ENVIRONMENTAL MANAGEMENT POLICIES,
British Columbia Univ., Vancouver. Dept. of Economics.
For primary bibliographic entry see Field 5G.
W77-02124

ECOLOGICAL IMPACTS OF SNOWPACK AUGMENTATION IN THE SAN JUAN MOUNTAINS OF COLORADO.
Colorado State Univ., Fort Collins. Coll. of Forestry and Natural Resources.
For primary bibliographic entry see Field 3B.
W77-02160

A COMPUTERIZED INFORMATION SYSTEM ON THE IMPACTS OF COAL-FIRED ENERGY DEVELOPMENT IN THE SOUTHWEST,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
D. W. Layton.
Ph.D. Dissertation, 1975. 108 p, 3 fig, 15 tab, 4 append.

Descriptors: *Computer programs, *Data processing, *Electric power production, *Southwest US, Environmental effects, Data storage and retrieval, Systems analysis, Computers.

Research was conducted on the development and evaluation of a computerized information system designed to selectively transfer data on the individual and cumulative impacts of several electric generating facilities in the southwestern United States. Primary impacts considered by the Four Corners Program, of which this system was a part, include those on surface water and groundwater. This system incorporates elements of management and environmental information systems and an issue-oriented system developed at the University of Illinois, thus providing the capacity for communicating impact information derived from various sources. The system can retrieve textual material stored in a base information file or execute on-line simulation models and routines in order to describe environmental impacts. The acquisition and communication of environmental impact information is discussed, and the hybrid system's design and development outlined. Evaluation was conducted by demonstrating the system to prospective users from electrical utilities, government agencies and members of the public in Arizona. Results indicate that this technology is a viable means of transmitting environmental information and that its usefulness is likely to depend more on credibility than convenience. (Jahns-Arizona)
W77-02163

ENERGY DEVELOPMENT: THE ENVIRONMENTAL TRADEOFFS. VOL. 2: RELATIVE ENVIRONMENTAL ASSESSMENT OF METHODS TO INCREASE ENERGY PRODUCTION, CRUDE OIL, PIPELINE QUALITY GAS, AND ELECTRICITY FROM WESTERN COAL,
Stanford Research Inst., Menlo Park, Calif.
M. D. Levine, and R. V. Steele.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-250 001, Price codes: A07 in paper copy, A01 in microfiche. Report October 1975. 125 p. 3 fig, 28 tab, 55 ref. 68-01-2469.

Descriptors: *Alternative planning, *Decision making, *Energy conversion, *Evaluation, *Environmental effects, Air pollution, Natural gas, Water quality, Oil fields, Land use, Social impact, Public health, Aesthetics, Water consumption, Electric power production, Coals, Oil shales, Fossil fuels.
Identifiers: *Energy production, *Environmental tradeoffs, *Environmental impacts, Coal liquefaction, Coal gasification.

The relative environmental tradeoffs among each of three sets of options for increasing energy production are analyzed. Environmental indicators used in the analysis include sulfur dioxide, nitrogen oxides, and particulate impacts on air quality, public health, aesthetics, land use, water consumption relative to availability, and water quality. Results indicate that options for development and use of Western coal for electricity generation reflect the following: (1) low-Btu gasification/combined-cycle electricity generation is less environmentally damaging than steam electricity generation, (2) the critical tradeoffs between steam generation in the West and in the Midwest are the adverse social impacts, high water consumption and potential degradation of clean air in the West versus high levels of air pollution near populated areas in the Midwest, and (3) low-Btu gasification/combined-cycle electricity generation in the Midwest has significantly lower social and water consumption impacts than the same technology in the West. Tradeoffs among seven measures for increasing domestic oil production, and among four options for increasing pipeline quality gas supplies were also analyzed. It was concluded that the use of miscellar flood techniques of assisted recovery pose the least adverse environmental risks and oil shale development the greatest risks among the choices for crude oil supplies, and gasification of midwestern coal and production of gas from Atlantic and southern Caifornia OCS were the most favorable options for gas supplies. (See also W76-13039) (Luedtke-Wisconsin)
W77-02423

ECONOMIC AND ENVIRONMENTAL IM PACTS OF AGRICULTURAL LAND DRAINAGE IN ONTARIO,
York Univ., Downsview (Ontario). Dept. of Geography.
For primary bibliographic entry see Field 4A.
W77-02425

ATLANTIC OFFSHORE OIL: THE NEED FOR PLANNING AND REGULATION,
Woods Hole Oceanographic Institution, Mass Marine Policy and Ocean Management Program.
J. M. Friedman.
Oceanus, Vol 19, No 1, p 22-37, 1975. 3 fig.

Descriptors: *Planning, *Regulation, *New England, *Oil fields, *Continental Shelf, Regional development, Social impact, Economic impact, Federal jurisdiction, State jurisdiction, Leases, Oil industry, Offshore platforms, Oil spills, Coasts, Atlantic Ocean.
Identifiers: *Onshore impact, *Offshore oil fields, Outer Continental Shelf Land Act, Coastal Zone Management Act, Georges Bank.

The legal-administrative structure for offshore oil development particularly as it affects the New England states through development of the George Bank area is discussed. The basic framework for offshore oil development was established by the 1953 Outer Continental Shelf Land Act which gave administrative authority to the Secretary of the Interior who in turn delegated this authority to the Bureau of Land Management (BLM) for leasing of offshore tracts, and to the U.S. Geological Survey (USGS) for regulation of offshore operations. Federal authority for offshore authorization and regulation was sustained by the 1975 case of the United States vs. Maine. During this same period however, growing public awareness of the environmental costs of unplanned development has led to the enactment of a number of antipollution laws. The most significant for the administrative legal framework of offshore oil development is the Coastal Zone Management Act which provides a mechanism for coordinating federal and state programs and recognizes that the protection of coastal resources is best achieved through strong local and state participation. To date, BLM and USGS reliance on oil company opinion and expertise has led to poor federal-state relations and hampered effective socio-economic and environmental planning, which is necessary to regulate both pollution and onshore impacts of offshore oil development. Parallels between North Sea development by Scotland and Norway and the New England situation are also suggested. (Luedtke-Wisconsin)
W77-02426

ENVIRONMENTAL TRUST FUNDS: AN EVALUATION,
RIVUS, Inc., Glen Burnie, Md.
For primary bibliographic entry see Field 5G.
W77-02432

STRIP-MINING TECHNIQUES TO MINIMIZE ENVIRONMENTAL DAMAGE IN THE UPPER MISSOURI RIVER BASIN STATES,
Bureau of Mines, Denver, Colo. Intermountain Field Operation Center.
For primary bibliographic entry see Field 5G.
W77-02445

NATIONAL ENVIRONMENTAL STATISTICAL REPORT,
Mitre Corp., McLean, Va.
For primary bibliographic entry see Field 7C.
W77-02447

ANALYSIS OF POLLUTION FROM MARINE ENGINES AND EFFECTS ON THE ENVIRONMENT. SUMMARY REPORT.
Boating Industry Associations, Chicago, Ill.

For primary bibliographic entry see Field 5C.
W77-02449

ARE THE CHESAPEAKE BAY WATERS WARMING UP,
Johns Hopkins Univ., Baltimore, Md. Dept. of Geography and Environmental Engineering.
For primary bibliographic entry see Field 2L.
W77-02472

OLD ANSWERS TO 'NEW' PROBLEMS: HENRY GEORGE, PROPERTY RIGHTS AND ENVIRONMENTAL QUALITY,
Clemson Univ., S.C.
For primary bibliographic entry see Field 6B.
W77-02539

SURVEY OF MACROINVERTEBRATE COMMUNITIES IN THE PROVO RIVER AND DIAMOND FORK SYSTEMS,
Brigham Young Univ., Provo, Utah. Center for Health and Environmental Studies.
For primary bibliographic entry see Field 5C.
W77-02548

ENVIRONMENTAL ASPECTS OF CHEMICAL USE IN PRINTING OPERATIONS, SEPTEMBER 22-24, 1975, KING OF PRUSSIA, PA.), CONFERENCE PROCEEDINGS.
Environmental Protection Agency, Washington, D. C. Office of Toxic Substances.
For primary bibliographic entry see Field 5C.
W77-02553

I. RESOURCES DATA

A. Network Design

EVALUATION OF THE FEASIBILITY OF USING THE DATA COLLECTION SYSTEM TO OPERATE A NETWORK OF HYDROLOGICAL AND CLIMATO-LOGICAL STATIONS AT SITES REMOTE FROM NORMAL COMMUNICATION LINKS,
Department of Natural Resources, Quebec.
For primary bibliographic entry see Field 7B.
W77-02501

B. Data Acquisition

GEOPHYSICAL STUDY OF THE WATERBEARING STRATA IN BITTERROOT VALLEY, MONTANA,
Montana Univ., Missoula. Dept of Geology.
For primary bibliographic entry see Field 2F.
W77-02085

MEASUREMENTS OF THE TURBULENT BOUNDARY LAYER UNDER PACK ICE,
Washington Univ., Seattle. Dept of Geophysics.
For primary bibliographic entry see Field 2C.
W77-02138

SELF STREAM KINEMATICS INFERRED FROM A SATELLITE-TRACKED DRIFTER,
Texas A and M Univ., College Station. Dept. of Oceanography.
For primary bibliographic entry see Field 2L.
W77-02140

THE USE OF LANDSAT DCS AND IMAGERY FOR RESERVOIR MANAGEMENT AND OPERATION,
Corps of Engineers, Waltham, Mass. New England Div.
For primary bibliographic entry see Field 4A.
W77-02151

PROGRAM REPORT-FY 1975, ATMOSPHERIC AND GEOPHYSICAL SCIENCES DIVISION, PHYSICS DEPARTMENT.
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 2B.
W77-02157

APPLICATIONS OF ERTS PRODUCTS IN RANGE AND WATER MANAGEMENT PROBLEMS, SAHELIAN ZONE: MALI, UPPER VOLTA AND NIGER,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 4A.
W77-02167

OPTICAL REMOTE SENSING OF WATER POLLUTANTS,
Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
For primary bibliographic entry see Field 5A.
W77-02192

A NEW TECHNIQUE FOR REMOTE MONITORING OF ACTIVITY OF FRESHWATER INVERTEBRATES WITH SPECIAL REFERENCE OXYGEN CONSUMPTION BY NIAIDS OF ANAX SP. AND SOMATOCHLORA SP. (ODONATA),
Environmental Protection Agency, Grosse Ile, Mich.
For primary bibliographic entry see Field 5C.
W77-02216

A SIMPLE APPARATUS FOR METERING VOLATILE LIQUIDS INTO WATER,
National Marine Fisheries Service, Tiburon, Calif. Tiburon Fisheries Lab.
P. E. Benville, Jr., and S. Korn.
J Fish Res Board Can. 31(3), p 367-368, 1974.

Descriptors: *Measurement, *Volatility, *Gases, Equipment, Instrumentation, Organic compounds, Aromatic compounds.
Identifiers: *Benzene, *Toluene, *Xylene, *Methylbenzene.

A metering device was developed to introduce benzene, toluene, xylene, and 1,2,4, trimethylbenzene vapors into water using air as a carrier gas. Setting the carrier gas flows for the respective aromatics at 10, 25, 120, and 500 cm3/min for 2 h resulted in concentrations of 8.2, 13.0, 12.0, and 7.2 micro-1/1, respectively, in 4 1 of water. The aromatic concentrations were maintained in a static system by bubbling air through the water, and in a continuous flow system by replenishing the water. In static systems the respective aromatic concentrations were maintained for 4 days within the ranges of 13-14, 5.1-7.0, 0.40-0.50, and 0.018-0.028 micro-1/1 by bubbling the aromatics into the water at 5 cm3/min and independently aerating the water at 100 cm3/min. In a 14-day continuous flow system benzene concentrations ranged from 2.1-2.8 micro-1/1 when benzene was bubbling at 23 cm3/min and water was flowing at 1.8 1/min.--Copyright 1974, Biological Abstracts, Inc.
W77-02454

MEASUREMENTS OF ACOUSTIC PROPERTIES OF HARD-PACK SNOW,
Montana State Univ., Bozeman. Dept. of Civil Engineering and Engineering Mechanics.
For primary bibliographic entry see Field 2C.
W77-02462

AUTOMATED SEISMIC MONITORING SYSTEM FOR LAKE MICHIGAN ICE STUDIES,
Wisconsin Univ., Milwaukee. Dept. of Geological Sciences.
For primary bibliographic entry see Field 2C.
W77-02468

SPECTRAL CHARACTERISTICS OF THE MICROWAVE EMISSION FROM A WIND-DRIVEN FOAM-COVERED SEA,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 2L.
W77-02476

REMOTE SENSING OF SOIL MOISTURE BY A 21-CM PASSIVE RADIOMETER,
Kansas Univ. Lawrence.
For primary bibliographic entry see Field 2G.
W77-02480

A TECHNIQUE FOR ESTIMATING TROPICAL OPEN-OCEAN RAINFALL FROM SATELLITE OBSERVATIONS,
Hawaii Univ., Honolulu. Dept. of Meteorology.
For primary bibliographic entry see Field 2B.
W77-02484

THE HAILPAD CALIBRATION FOR ITALIAN HAIL DAMAGE DOCUMENTATION,
Ufficio Centrale di Ecologia Agragia e difesa delle Piante coltivate dalle Avversita Meteoriche, Rome (Italy).
For primary bibliographic entry see Field 2B.
W77-02486

MONITORING WATER QUALITY FROM LANDSAT.
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 5A.
W77-02494

SATELLITE MICROWAVE OBSERVATIONS OF SOIL MOISTURE VARIATIONS,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 2G.
W77-02495

AN OPERATIONAL APPLICATION OF SATELLITE SNOW COVER OBSERVATIONS - NORTHWEST UNITED STATES,
Bonneville Power Administration, Portland, Oreg.
For primary bibliographic entry see Field 2C.
W77-02496

REMOTE SENSING OF EFFECTS OF LAND-USE PRACTICES ON WATER QUALITY,
Kentucky Univ., Lexington. Dept. of Forestry.
For primary bibliographic entry see Field 5A.
W77-02497

MULTIDISCIPLINARY APPLICATION OF LANDSAT-2 DATA TO MARINE ENVIRONMENT IN CENTRAL JAPAN,
Toba Merchant Marine Coll. (Japan).
For primary bibliographic entry see Field 2L.
W77-02498

SKYLAB IMAGERY: APPLICATION TO RESERVOIR MANAGEMENT IN NEW ENGLAND,
Cold Regions Research and Engineering Lab., Hanover, N.H. Research Div.
For primary bibliographic entry see Field 4A.
W77-02499

USE OF THE LANDSAT-2 DATA COLLECTION SYSTEM IN THE COLORADO RIVER BASIN WEATHER MODIFICATION PROGRAM,
Bureau of Reclamation, Denver, Colo. Div. of Atmospheric Water Resources Management.
For primary bibliographic entry see Field 2B.
W77-02500

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EVALUATION OF THE FEASIBILITY OF USING THE DATA COLLECTION SYSTEM TO OPERATE A NETWORK OF HYDROLOGICAL AND CLIMATO-LOGICAL STATIONS AT SITES REMOTE FROM NORMAL COMMUNICATION LINKS,
Department of Natural Resources, Quebec.
R. Perrier.
Available from the National Technical Information Service, Springfield, VA 22161 as N76-16516, Price codes: A02 in paper copy, A01 in microfiche. Report NASA-CR-145996, May 1974. 15 p, 5 fig, 1 tab. NASA SR No. 9663.

Descriptors: *Equipment, *Instrumentation, *Data collections, *Remote sensing, Satellites(Artificial), Temperature, Water levels, Data processing, Gaging stations, Costs, Networks, Economics.
Identifiers: *LANDSAT, *ERTS, Data collection platforms.

A base station constituted of a Data Collection Platform (DCP) and four sensors was evaluated on the following aspects: (1) the adequacy of the sensors used in conjunction with the platform to measure four hydrometeorological variables was examined; (2) the continuity and availability of the measurements obtained during the period were considered; (3) the data obtained were used in conjunction with climato-logical data obtained at other nearby conventional stations and hydrometrical data compared with those recorded at the same stations. (Sims-ISWS)
W77-02501

USE OF LANDSAT DATA FOR NATURAL RESOURCES INVESTIGATION IN THE LOWER BASIN OF DANUBE AND DANUBE DELTA,
Institutul de Constructii din Bucuresti (Rumania). Lab. for Remote Sensing.
For primary bibliographic entry see Field 2L.
W77-02503

SKYLAB STUDY OF WATER QUALITY,
Geological Survey, Lawrence, Kans.
For primary bibliographic entry see Field 5A.
W77-02505

RETRANSMISSION OF HYDROMETRIC DATA IN CANADA,
Department of the Environment, Ottawa (Ontario). Applied Hydrology Div.
For primary bibliographic entry see Field 7C.
W77-02506

USE OF RADAR INFORMATION IN DETERMINING FLASH FLOOD POTENTIAL,
National Weather Service, Garden City, N. Y. Eastern Region.
For primary bibliographic entry see Field 2B.
W77-02509

OZONE REMOVAL FROM ARC LAMP COOLING AIR,
Auburn Univ., Ala. Charles Richard Saunders Chemical Lab.
W. C. Neely, A. D. West, and T. D. Hall.
Journal of Physics, Section E: Scientific Instruments, 1975, Vol 8, p. 543, 6 ref. OWRT A-035-ALA(7).

Descriptors: *Ozone, Air pollution, Air pollution effects
Identifiers: Cooling air stream, *Catalytic converters, Arc lamp.

An inexpensive, compact and efficient catalytic converter for removal of ozone from the cooling air stream of compact arc lamps is described. The device uses no power and requires no regeneration. Test results are presented showing essentially complete removal of ozone from the cooling air stream of a typical 150 W xenon arc lamp.
W77-02511

7C. Evaluation, Processing and Publication

AQUEOUS HALOGEN EQUILIBRIA, CASE I. HALOGEN IN PURE WATER,
Army Medical Bioengineering Research and Development Lab., Fort Detrick, Md.
For primary bibliographic entry see Field 5D.
W77-02150

A COMPUTERIZED INFORMATION SYSTEM ON THE IMPACTS OF COAL-FIRED ENERGY DEVELOPMENT IN THE SOUTHWEST,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources
For primary bibliographic entry see Field 6G.
W77-02163

APPLICATIONS OF ERTS PRODUCTS IN RANGE AND WATER MANAGEMENT PROBLEMS, SAHELIAN ZONE: MALI, UPPER VOLTA AND NIGER,
Geological Survey, Denver, Colo
For primary bibliographic entry see Field 4A.
W77-02167

COMPILATION OF STATE DATA FOR EIGHT SELECTED TOXIC SUBSTANCES, VOL. 1, FINAL REPORT,
Mitre Corp., McLean, Va.
For primary bibliographic entry see Field 5G.
W77-02204

COMPILATION OF STATE DATA FOR EIGHT SELECTED TOXIC SUBSTANCES, VOL. IV, COMPILATIONS OF SUMMARIES AND ANALYSES OF STATE DATA,
Mitre Corporation, McLean, Va.
For primary bibliographic entry see Field 5G.
W77-02205

PROJECT DEVELOPMENT AND DATA PROGRAMS FOR ASSESSING THE QUALITY OF THE WILLAMETTE RIVER, OREGON,
Geological Survey, Portland, Oreg. Water Resources Div.
For primary bibliographic entry see Field 2E.
W77-02301

SIMULATED EFFECTS OF THE PROPOSED TENNESSEE COLONY RESERVOIR ON GROUND-WATER CONDITIONS IN THE CARRIZO-WILCOX AQUIFER AND TRINITY RIVER ALLUVIUM, TEXAS,
Geological Survey, Austin, Tex. Water Resources Div.
For primary bibliographic entry see Field 4A.
W77-02305

SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70: PART 1. NORTH ATLANTIC SLOPE BASINS--VOLUME 3. BASINS FROM MARYLAND TO YORK RIVER.
Geological Survey, Reston, Va. Water Resources Div.
Available from Branch of Distribution, USGS, 1200 S. Eades St., Arlington, VA, 22202, price $7.00. Geological Survey Water-Supply Paper 2103, 1976. 971 p, 1 fig.

Descriptors: *Hydrologic data, *Surface waters, *Streamflow, *Lakes, Delaware, Maryland, New York, Pennsylvania, Virginia, West Virginia, Basic data collections, Runoff, Discharge(Water), Gaging stations, Flow measurement, Flow rates, Reservoirs
Identifiers: *North Atlantic slope basins, Reservoir content.

This report is one of a series of 37 reports presenting records of stage and discharge of streams, and of stage and contents of lakes and reservoirs in the United States during the 1966-70 water years; it contains the records for gaging stations and partial-record stations in the North Atlantic slope basins, Maryland to York River. The daily table for stream-gaging stations gives the mean discharge for each day and is followed by monthly and yearly summaries of total, average, maximum and minimum discharges. Data for partial-record stations are presented in two tables. The first is a table of discharge measurements at low-flow partial-record stations, and the second is a table of annual maximum stage and discharge at crest-stage stations. Occasionally, a series of discharge measurements are made within a short time period to investigate the seepage gains or losses along a reach of a stream or to determine the low-flow characteristics of an area. Such measurements are given in special tables. For a lake or reservoir station, capacity tables giving the contents for an stage are prepared from stage-area relation curves defined by surveys. The application of the stage to the capacity table gives the contents, from which the daily, monthly, or yearly change in contents is computed. (Woodard-USGS)
W77-02307

THE MERIDIAN-UPPER WILCOX AQUIFER I MISSISSIPPI,
Geological Survey, Jackson, Miss. Water Resources Div.
E. H. Boswell.
Water-Resources Investigations 76-79 (open-file report), June 1976. 3 sheets, 19 fig, 3 tab, 17 ref.

Descriptors: *Groundwater resources, *Aquifer characteristics, *Water yield, *Water quality, *Mississippi, Hydrologic data, Water well, Pumping, Hydrogeology, Drawdown, Groundwater recharge, Water utilization, Water supply, *Maps
Identifiers: *Wilcox Group, Tallahatta Formation

The Meridian-upper Wilcox aquifer contains freshwater in a 15,000 sq mi area in northwestern and central Mississippi. The aquifer comprises the Meridian Sand Member of the Tallahatta Formation and discontinuous hydraulically connected sand beds in the upper part of the Wilcox Group. The aggregate sand thickness of the aquifer ranges from less than 50 ft to about 500 ft. The withdrawal of fresh water from the aquifer in Mississippi in 1975 was about 32 Mgal/d. Long-term water-level trends indicate an average decline of about 1 ft per year. Thick, permeable sand beds yield as much as 2,800 gal/min to wells and fresh water extends to depths of more than 2,000 ft. The aquifer is used extensively in areas where the dissolved-solids content exceeds 500 mg/liter, however, the most common problems in water supplies are excessive iron and corrosiveness. (Woodard-USGS)
W77-02310

DEPTH TO WATER TABLE, RECHARGE AREAS, DRAINAGE BASINS, AND RELIEF OF DUVAL COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla. Water Resources Div.
L. V. Causey.
Water-Resources Investigations 52-75 (open-file map), 1975. 4 sheets, 4 maps.

Descriptors: *Hydrologic data, *Surface water, *Groundwater, *Water level fluctuation, *Groundwater recharge, Drainage area, Topography, *Maps.
Identifiers: *Duval County(Fla).

This 3-sheet map report depicts hydrologic systems of surface water and groundwater in Duval County, Florida. The maps are from

1:20,000 and 1:62,500 quadrangles, U.S. Geological Survey. Symbols and colors describe water levels, groundwater recharge, drainage areas, and topography. (Woodard-USGS)
W77-02311

MAPS SHOWING GROUND-WATER CONDITIONS IN THE LOWER BIG CHINO VALLEY AND WILLIAMSON VALLEY AREAS, YAVAPAI AND COCONINO COUNTIES, ARIZONA,
Geological Survey, Tucson, Ariz. Water Resources Div.
B. L. Wallace, and R. L. Laney.
Water-Resources Investigations 76-78 (open-file report), June 1976. 2 sheets, 2 maps, 2 ref.

Descriptors: *Groundwater, *Water levels, *Pumping, *Water quality, Specific conductivity, Fluorides, *Maps, *Arizona.
Identifiers: Yavapai and Coconino Counties(Ariz), Lower Big Chino Valley area, Williamson Valley area.

Arizona is divided into 67 ground-water areas, and individual areas are selected for intensive data collection once every 6 years. The data collected in the lower Big Chino Valley and Williamson Valley areas are given on maps that show depth to water, well depth, and altitude of the water level, 1975-76; pumpage, 1950-74; and specific conductance, fluoride concentration, and irrigated area, 1974. Scale 1:125,000. (Woodard-USGS)
W77-02312

STRATIGRAPHY OF THE PALEOCENE AND LOWER PART OF THE EOCENE IN WESTERN TENNESSEE,
Geological Survey, Nashville, Tenn. Water Resources Div.
For primary bibliographic entry see Field 2F.
W77-02315

A BIVARIATE-REGRESSION MODEL FOR ESTIMATING CHEMICAL COMPOSITION OF STREAMFLOW OR GROUNDWATER,
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-02317

WATER RESOURCES INFORMATION NEEDS FOR THE SUWANNEE RIVER WATER MANAGEMENT DISTRICT,
Geological Survey, Tallahassee, Fla. Water Resources Div.
For primary bibliographic entry see Field 4A.
W77-02318

NATIONAL ENVIRONMENTAL STATISTICAL REPORT,
Mitre Corp., McLean, Va.
Duncan, D. Elcock, and G. Hollins.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-246 233, Price codes: A12 in paper copy, A01 in microfiche. Technical Report MTR-6957, October 1975. 265 p. 30 tab. 2930. CEQ F 19628-76-C-0001.

Descriptors: *Data collections, *Statistics, Air pollution, *Water quality, Land use, Solid wastes, Recycling, Pesticides, Toxicity, Agriculture, Forests, Wildlife, Food abundance, Water sources, Recreation, Energy, Mineralogy, Transportation, Human population, Economics, Water pollution.
Identifiers: *Environmental quality, Demography, Housing, Environmental impact statements, Noise pollution.

A variety of environmental and related data available as of May 1975 from various sources are presented in approximately 200 statistical and summary tables. Three kinds of general data categories are included: (1) basic environmental categories, (2) categories which provide data directly related to environmental quality, and (3) data categories which are frequently compared to or used in the analysis of environmental data. The tables are arranged by data type under 16 subject categories. These are: air quality, water quality, land use, solid waste and recycling, pesticides and toxic substances, agriculture and food supply, forests and wildlife, water resources, recreation, minerals, energy, transportation, housing, demography, economics, and environmental impact statements. In order to ensure continuity between this publication and future updates, data which are collected and updated on a regular basis were selected. All 50 states and the District of Columbia are represented by the data, as well as a few tables of international data to give perspective to the United States data. A comprehensive index facilitates the identification of data. (Luedtke-Wisconsin)
W77-02447

AN EVALUATION OF WATER QUALITY INFORMATION: A CASE STUDY OF STREAMS IN METROPOLITAN NEW JERSEY,
Rutgers - The State Univ., New Brunswick, N. J. Dept. of Geography.
For primary bibliographic entry see Field 5A.
W77-02448

MATHEMATICAL MODELS IN HYDRAULICS AND COASTAL ENGINEERING,
International Courses in Hydraulic and Sanitary Engineering, Delft (Netherlands).
For primary bibliographic entry see Field 2A.
W77-02471

LARGE-SCALE CURRENT MEASUREMENTS IN LAKE HURON,
National Oceanic and Atmospheric Administration, Ann Arbor, Mich. Great Lakes Environmental Research Lab.
For primary bibliographic entry see Field 2H.
W77-02473

THE ANNUAL VOLUME OF U.S. PRECIPITATION AND ITS VARIATIONS FOR THE PERIOD 1931-1971,
Eastern Washington State College, Cheney. Dept. of Physics.
For primary bibliographic entry see Field 2B.
W77-02483

SKYLAB IMAGERY: APPLICATION TO RESERVOIR MANAGEMENT IN NEW ENGLAND,
Cold Regions Research and Engineering Lab., Hanover, N.H. Research Div.
For primary bibliographic entry see Field 4A.
W77-02499

RETRANSMISSION OF HYDROMETRIC DATA IN CANADA,
Department of the Environment, Ottawa (Ontario). Applied Hydrology Div.
R. A. Halliday.
Report NASA-CR-146322, Quarterly Report SR 28190, January 1976. 7 p, 1 fig, 2 tab.

Descriptors: *Satellites(Artificial), *Meteorological data, *Canada, Hydrologic data, Water resources, Flood forecasting, Water levels, On-site data collections, Inflow, Data collections, Computers.
Identifiers: *Data collection platforms, *LANDSAT, Hydrometric data, Test site, Solar panel, Retransmission.

Data collection platforms (DCPs) had been installed at 17 sites in remote areas of Canada for transmittal of water level and other water resources data. The near real time data were used for water management purposes. The system met all requirements, and the suitability of satellite retransmission was demonstrated. Capital costs of the equipment installed at gaging stations were reasonable, and indications were that the DCPs did not require much maintenance. The potential impact of this technology on water resources data gathering activities was thought to be considerable. It was concluded that more work with quasi-operational programs is needed to determine the benefits precisely. (Roberts-ISWS)
W77-02506

8. ENGINEERING WORKS

8A. Structures

THE DESIGN AND TEST OF A SAFE AND EFFECTIVE STORM-SEWER INLET,
Kansas Water Resources Research Inst., Manhattan.
For primary bibliographic entry see Field 8B.
W77-02186

TANKS OF PANEL CONSTRUCTION.
Water and Waste Treatment, Vol. 19, No. 7, p 26, July, 1976.

Descriptors: *Sewage treatment, *Aeration, Equipment, *Construction, Materials, Materials engineering, Waste water treatment.
Identifiers: Clarification tanks, *Aeration tanks.

A Diapac sewage treatment unit constructed of modular tank panels is described. The Diapac unit consists of two tanks, each designed for both aeration and clarification. Since tank construction is based on the use of modular tank panels which are prefabricated and produced in standard size, erection of the tanks consists of a simple bolting up and sealing operation. The tanks can also be taken down and installed at another site with relative ease. (Kreager-FIRL)
W77-02325

AUSTIN'S 11 MILE SEWER TUNNEL REFLECTS SOUND ECONOMIC, ENVIRONMENTAL ALTERNATIVES,
Austin City Dept. of Construction Management, Tex.
For primary bibliographic entry see Field 5D.
W77-02327

8B. Hydraulics

SCOURING OF COHESIVE SOILS,
Howard Univ., Washington, D. C. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W77-02127

GRID TURBULENCE IN HYDRAULIC MODELS,
Windsor Univ. (Ontario). Dept. of Engineering.
J. A. McCorquodale, and A-A. A. Hannoura.
Journal of Hydraulic Research, Vol. 14, No. 3, p 207-216, 1976. 7 fig, 2 tab, 11 ref.

Descriptors: *Turbulence, *Laboratory tests, *Froude number, *Hydraulic similitude, *Viscosity, Hydraulic models, Momentum transfer, Boundary layers, Theoretical analysis, Sluice gates, Air entrainment, Equations.
Identifiers: *Free stream turbulence, Contraction coefficient, Vena contracta.

It is commonly believed that behavior of most free surface hydraulic models is adequately described by the Froude Law if Reynolds number exceeds a

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certain minimum value. However, free stream or grid turbulence may cause apparent scale effects that are even greater than the viscous effects. The higher turbulence levels in the model can result in excessive momentum transfer in zones of highly curvilinear flow. A laboratory model was constructed to obtain a correlation between the free stream turbulence levels and the measured contraction coefficient below sharp-edged sluice gates. The experimental studies indicated that (1) the free stream turbulence can significantly increase the vena contracta in sluice gate models, (2) the flat plate boundary layer displacement theory is not sufficient to explain the discrepancies between the experimental and theoretical values of the coefficient of contraction, (3) the kinematic viscosity model gives a reasonable explanation for the turbulence effect on the coefficient of contraction, and (4) further research is needed to assess the effect of air entrapment on the vena contracta. (Singh-ISWS)
W77-02128

ON THE RELIABILITY OF THE SPECTRAL METHOD FOR THE DESIGN OF OFFSHORE STRUCTURES,
Technische Universitaet, Munich (West Germany). Institut fuer Bauinzenieurwesen III.
G. I. Schueller.
Journal of Hydraulic Research, Vol. 14, No. 3, p 229-240, 1976. 4 fig, 3 tab, 20 ref, 1 append.

Descriptors: *Offshore platforms, *Waves(Water), *Tsunamis, *Wind tides, *Time series analysis, Mathematics, Coastal structures, Statistical methods, Loads(Forces), Ocean waves, Filters.
Identifiers: *Spectral method, Dynamic amplification factor, Wave force.

Spectral analysis is a useful tool for the design of structures subject to time-dependent stochastic loading as exerted by wind-generated water surface waves. Two major uncertainties have to be considered: the variation of the wave height spectrum given a time history of a water surface measured at a fixed point, and the dispersion of the wave force spectrum given the wave height spectrum. The second uncertainty and its influence on the dynamic amplification factor were discussed in this paper. The size of resolution and degree of confidence of spectral estimates as well as the filtering process were found to be important for the spectral shape, particularly in the subrange significant for structural design of dynamically excited linear systems. The coefficients of drag and inertia are radom variables. The effect of their dispersion on the variation of the force spectral estimate in terms of exceedance probabilities of the dynamic wave loads - using similarity wave height spectra - was discussed. The analysis was illustrated utilizing a template steel platform in 550 feet of water as a sample structure. (Singh - ISWS)
W77-02129

GEOMETRY OF RIPPLES AND DUNES IN ALLUVIAL CHANNELS,
Roorkee Univ. (India). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W77-02130

SYNTHETIC DESIGN HYETOGRAPH AND RATIONAL RUNOFF COEFFICIENT,
American Consulting Services, Inc., Minneapolis, Minn. Environmental Engineering.
For primary bibliographic entry see Field 2E.
W77-02135

FLOW CONTROL AND TRANSIENTS IN THE CALIFORNIA AQUEDUCT,
California State Dept. of Water Resources, Sacramento. Div. of Operations and Maintenance.
H. G. Dewey, Jr, and W. R. Madsen.
Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, Vol. 102, No. IR3, Proceedings Paper 12434, p 335-348, September 1976. 10 fig, 1 tab, 2 ref, 1 append.

Descriptors: *California, *Control systems, *Flow control, *Gates, Water supply, Aqueducts, Hydraulics, Operations, Water conservation, Water distribution(Applied), Channels, Open channels.
Identifiers: *California State Water Project, *Gate operation, Operational procedures.

From initial operation of the California Aqueduct of the California State Water Project in 1967 to the present, the method of gate operation for flow control has been modified to keep up with the changing operational demands. Initially serial gate operation was employed. Then, as operating demands increased, a new method called simultaneous gate operation which uses the controlled volume concept was implemented. As flow changes increased, still another method, known as timed gate operation which is another variation of the controlled volume concept, was initiated. This latest method satisfies all present operating requirements and is expected to meet all future operating requirements. Recent flow change tests indicated that timed gate operation will control the fluctuations within the allowable limits for flow changes up to and including designed flow quantities in the range of 13,100 cfs (370 cu m per sec). Refinement to the timed gate operation can further reduce the magnitude of hydraulic transients during major flow changes. (Lee-ISWS)
W77-02136

INVESTIGATION OF TWO-REGIME WELL FLOW,
University Coll. of Swansea (Wales).
For primary bibliographic entry see Field 4B.
W77-02142

THEORETICAL MONOCHROMATIC-WAVE-INDUCED CURRENTS IN INTERMEDIATE WATER WITH VISCOSITY AND NONZERO MASS TRANSPORT,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 2L.
W77-02159

MINIMIZING COSTS IN WELL FIELD DESIGN IN RELATION TO AQUIFER MODELS,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
C. A. Bostock.
Ph.D. Dissertation, 1975. 144 p, 14 fig, 48 ref, append.

Descriptors: *Cost analysis, *Water wells, *Model studies, *Aquifer management, Permeability, Pumping, Well spacing, Groundwater mining, Cost allocation.
Identifiers: *Aquifer models, *Aquifer permeability.

Well field design costs are minimized by the well density-capacity combination used to meet groundwater demand. A well design method discussed accounts for lateral variations in aquifer permeability, but not water benefits or transmission lines for water and power. All wells are equally spaced in a grid pattern and have the same design. Cost determination and distribution are discussed. The aquifer selected to demonstrate this method is unconfined and, except for permeability, is uniform laterally. Groundwater mining occurs during the annual pumping season. The method is defined and illustrated using the assumption of a homogeneous aquifer, with all wells operating simultaneously at equal discharge rates. The influence of nonuniform permeability is analyzed, along with inter-cell flow effects due to possible distributions of heterogeneous permeability and non-simultaneous pumping. The method described for illustration is considered applicable to aquifer and climatic conditions like those in Bangladesh. Equations are given for estimating errors associated with approximating the boundary shapes of hexagonal, square and equilateral cells by a circle of equal area. (Jahns-Arizona)
W77-02161

THE DESIGN AND TEST OF A SAFE AND EFFECTIVE STORM-SEWER INLET,
Kansas Water Resources Research Inst., Manhattan.
Y. S. Yu.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 345. Price codes: A04 in paper copy, A01 in microfiche. Contribution No. 183, August 1976. 42 p, 8 fig, 2 tab, 2 ref, append. OWRT A-076-KAN(1). 14-34-0001-6017

Descriptors: *Design *Testing, Storm water, *Storm drains, *Intakes, Interceptor sewers, Drains, Slopes, Road design, *Sewers
Identifiers: Grates, Curbs, Scale models.

A new combination inlet for storm water was designed and tested on a 1:4 scale model to determine its hydraulic efficiency. Experimental results obtained from two transverse slopes, 1/48 and 1/32, and seven longitudinal slopes equal to 0.006, 0.01, 0.02, 0.03, 0.04, 0.06 and 0.08 shows that the new inlet maintains, relatively high intercept ratio over a wide range of these variables at low as well as high total discharges. Prototype tests are recommended to insure that this new inlet is also bicycle safe
W77-02186

DILUTION AND DESIGN,
Water Pollution Research Lab., Stevenage (England).
For primary bibliographic entry see Field 5E.
W77-02332

PARTIAL WAVE DAMPING IN PNEUMATIC BREAKWATERS,
Royal Norwegian Air Force Academy, Trondheim.
I. Brevik
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 102, No. HY9, Proceedings Paper 12374, p 1167-1176, September 1976. 4 fig, 7 ref, 2 append.

Descriptors: *Breakwaters, *Hydraulics, *Waves(Water), *Theoretical analysis, Ocean waves, Wavelengths, Turbulence, Dispersion, Energy loss, Analytical techniques.
Identifiers: *Hydraulic breakwaters, Power consumption, Wave amplitude.

Power consumption in pneumatic (or hydraulic) breakwaters is very large if complete stopping of the oncoming waves is to be achieved. Partial damping of the oncoming waves can be attained if supplied power to pneumatic breakwaters is less. A theoretical analysis of the problem was attempted considering the available breakwater and amplification variation theories. The theory predicted no damping at all until the opposing current is sufficiently strong to give wave stopping. If the current exceeds the breaking limit, it was found convenient to divide the whole breakwater into three distinct regions. Reasonable agreement with the large-scale pneumatic experiments of Bulson was obtained. (Singh-ISWS)
W77-02455

EVALUATION OF CIRCULATION IN ESTUARIES,
Lawler, Matusky and Skelly Engineers, Tappan, N. Y.
For primary bibliographic entry see Field 2L.
W77-02456

)BLIQUE IMPINGEMENT OF PLANE TURBU-ENT JETS,
Research Council of Alberta, Edmonton. Highway nd River Engineering Div.
. Beltaos.
ournal of the Hydraulics Division, American ociety of Civil Engineers, Vol. 102, No. HY9, roceedings Paper 12388, p 1177-1192, September 976. 14 fig, 1 tab, 31 ref, 2 append.

escriptors: *Jets, *Turbulence, *Shear stress, Hydrodynamics, *Momentum transfer, Pressure, Nozzles, Potential flow, Model studies, nalytical techniques, Reynolds number.
dentifiers: *Oblique impingement, Static pres-ire, Wall pressure.

Vall pressure and shear stress in the impingement egion were studied experimentally, and semi-em-irical methods for their prediction were eveloped. The solutions of the corresponding otential flow problem were used to obtain atisfactory estimates of the eccentricity of the agnation point. The similarity analysis of the assical wall jet was employed for the wall jet re-on. Analytical results were substantiated using xisting data. The local skin friction factor was nown to be independent of impingement height nd angle but to decrease as the -1/5 power of the t Reynolds number. The wall jet thickness grows nearly at a slope that depends slightly on the eynolds number. For Reynolds numbers over 0,000, the maximum wall jet velocity decreases the inverse square root of distance and is inde-ndent of the impingement height. The effect of e impingement angle on the velocity was evalu-ed using the momentum equation and a potential ow analogy. (Singh-ISWS)
'77-02464

ATHEMATICAL MODELS IN HYDRAULICS ND COASTAL ENGINEERING,
ternational Courses in Hydraulic and Sanitary ngineering, Delft (Netherlands).
or primary bibliographic entry see Field 2A.
'77-02471

ATER MOTION ON A BEACH IN THE RESENCE OF A BREAKWATER: 1. WAVES,
rnell Univ., Ithaca, N.Y. Dept. of Civil and En-ronmental Engineering.
L. F. Liu, and C. C. Mei.
urnal of Geophysical Research, Vol 81, No 18, p 79-3084, June 20, 1976. 6 fig, 7 ref. Army ACW-72-72C-0023.

escriptors: *Waves(Water), *Beaches, reakwaters, Refraction(Water waves), flectance, Ocean waves, Coasts, Equations, ores, Model studies, Numerical analysis, athematical models, Wavelengths, Estuaries, eanography.
entifiers: *Wave diffraction.

r a long breakwater on a slowly varying bottom, asymptotic theory was given which accounts the combined effects of refraction and Fresnel fraction of water waves. Numerical examples re given for two cases: an offshore breakwater l an isolated jetty. (See also W77-02475) (Sims-VS)
'7-02474

ATER MOTION ON A BEACH IN THE ESENCE OF A BREAKWATER: 2. MEAN RRENTS,
rnell Univ., Ithaca, N.Y. Dept. of Civil and En-nmental Engineering.
.-F. Liu, and C. C. Mei.
rnal of Geophysical Research, Vol 81, No 18, p 5-3094, June 20, 1976. 7 fig, 22 ref. Army CW-72-72C-0023.

criptors: *Currents(Water), *Waves(Water), aches, *Breakwaters, Refraction(Water waves), Coasts, Shores, Model studies, Numerical analysis, Mathematical models, Ocean waves, Water circulation, Estuaries, Oceanography.
Identifiers: *Wave diffraction.

A semi-empirical theory of breaking-induced mean currents on a beach was developed to study the combined effects of refraction and diffraction. With the omission of convective inertia and lateral turbulent diffusion, the resulting averaged equations were solved by finite differences. The case of an offshore breakwater was studied in detail, and the predicted current pattern was found to be consistent with laboratory observations and the known tendency of tombolo formation near sandy beaches. Numerical results for an isolated breakwater extending from the shore were also presented, and observational evidences cited. (See also W77-02474) (Sims-ISWS)
W77-02475

MARYLAND HIGHWAY DRAINAGE STUDY: VOLUME I - SUMMARY REPORT,
Maryland Univ., College Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4C.
W77-02490

MARYLAND HIGHWAY DRAINAGE STUDY: VOLUME II - A COMPARISON OF MARYLAND HIGHWAY DRAINAGE PRACTICES WITH THOSE OF OTHER AGENCIES,
Maryland Univ., College Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4C.
W77-02491

MARYLAND HIGHWAY DRAINAGE STUDY: VOLUME III - A LINKED SYSTEM MODEL FOR THE SYNTHESIS OF HYDROGRAPHS IN URBAN AREAS,
Maryland Univ., College Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4C.
W77-02492

MARYLAND HIGHWAY DRAINAGE STUDY: VOLUME VI - AN EXPERIMENTAL EXAMINATION OF THE SUBSURFACE DRAINAGE OF ROADWAYS,
Maryland Univ., College Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4C.
W77-02493

RISK-SAFETY FACTOR RELATION FOR STORM SEWER DESIGN,
Illinois Univ. at Urbana-Champaign. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W77-02551

8C. Hydraulic Machinery

LOCK WALL DEICING WITH WATER JETS: FIELD TESTS AT SHIP LOCKS IN MONTREAL, CANADA AND SAULT STE. MARIE, MICHIGAN,
National Research Council of Canada, Ottawa (Ontario). Div. of Mechanical Engineering; and National Research Council of Canada, Ottawa (Ontario). Gas Dynamics Lab.
W. H. Brierly, D. J. Calkins, S. L. DenHartog, M. Mellor, and H. T. Ueda.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-021 768, Price codes: A02 in paper copy, A01 in microfiche. Cold Regions Research and Engineering Laboratory Special Report 239, December 1975. 17 p, 9 fig, 3 tab, 4 ref.

Descriptors: *Locks, *Deicers, *Jets, *Ice, Nozzles, High pressure, Water, Hydraulics, Structures, Operation and maintenance, Maintenance costs, Equipment, Navigation, Ships, Channels.
Identifiers: *Ice removal, Ship locks, High-pressure water jets.

Tests were made to evaluate a proposed technique for removing ice from lock walls during winter navigation. The technique involved use of a high-pressure water jet to slice through ice collars that adhere to vertical walls. The test equipment consisted of (1) a jet lance tipped with a nozzle designed to produce a long coherent jet, (2) a small tractor (hydraulically driven) to carry the lance, and (3) a high-pressure pump unit to supply water to the lance. Tests were made with operating pressures from 3,000 to 14,000 lbf/sq in and nozzle diameters from 0.063 to 0.152 in. Most of the work involved pressures around 9000 lbf/sq in and nozzle diameters of approximately 0.09 in. Traverse speeds were in the range 3 to 17 ft/min. Jet penetrations of up to 4 ft were achieved in a single pass, and the equipment proved capable of cleaning the lock wall under the prevailing conditions. However, performance was somewhat less favorable than had been predicted, and a revised scheme involving changes in lock operating procedures was proposed. (Sims-ISWS)
W77-02156

CONSTRUCTION OF GOSCOTE SEWAGE PUMPING STATION,
M. L. Cooper.
Proceedings of the Institution of Civil Engineers, Vol. 60, Part 1, p 345-365, August, 1976. 16 fig, 3 tab, 8 ref.

Descriptors: *Sewage treatment, *Pumping plants, *Construction, *Structural design, *Concrete structures, Design criteria, Treatment facilities, Materials.

The construction of a substructure for a raw sewage pumping station in Great Britain is described. The substructure consisted of a circular cofferdam (38 m in diameter and 15 m deep). The notable feature of the substructure was the employment for the first time at such a large scale of a precast concrete bolted segmental lining. Although the circular cofferdam had the disadvantage of requiring a relatively large amount of over-excavation and backfilling, it had the overwhelming advantage of providing an unobstructed working space. Specific details of the design and construction of the cofferdam are presented. (Kreager-FIRL)
W77-02326

ALARM SYSTEM CONTINUALLY MONITORS PLANT FUNCTIONS,
A. Hartenstein.
Public Works, Vol. 107, No. 9, p 86, September, 1976.

Descriptors: *Monitoring, *Treatment facilities, *Automation, *Failures, *Computers, Waste water treatment, Water treatment, Pumping plants, Costs.

An alarm system for continuously monitoring the functions of water and waste water treatment plants as well as pumping stations is described. During normal working hours, the alarm system is activated by a master control panel and dials a designated telephone number for the reporting of alarm conditions. Should a malfunction occur, one of 18 radio-equipped trucks will respond to the alarm. During non-working hours, the monitoring system activates a computer connection with the telephone company which automatically forwards the original call to a second telephone number via a telephone call diverter so that standby personnel who are available on a 24-hour basis can respond to the alarm. Functions that can be tied into the system include: low dissolved oxygen, high

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suspended solids, low chlorine residual, chlorine leaks, power failures, low pressure, and loss of air to a waste water treatment plants. The one-time charge for installing the system averages out to $1750 per installation with a monthly charge of $39.00 for telephone equipment. (Kreager-FIRL)
W77-02382

8D. Soil Mechanics

ELASTIC-PLASTIC STABILITY ANALYSIS OF MINE-WASTE EMBANKMENTS,
Bureau of Mines, Spokane, Wash. Spokane Mining Research Center.
E. L. Corp, R. L. Schuster, and M. M. McDonald.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-249 694, Price codes: A06 in paper copy, A01 in microfiche. Report of Investigation 8069, 1975. 104 p, 56 fig, 6 tab, 124 ref, append.

Descriptors: *Mine wastes, *Dams, *Spoil banks, Seepage, Stability, Dam failure, Mining engineering, Soil mechanics, Finite element analysis, Computer models, Model studies, Strength of materials, Soil strength, Soil physics, Engineering.

Seepage forces computed by a finite-element flow program were combined with gravity forces in an elastic-plastic stress-analysis program to determine the stability of mine-waste slopes. Computer output provided a cross-sectional plot of the dam or embankment showing the safety factors for each element. The combined finite-element program called SEEP-SLOPE was used to analyze several trial embankments and the 1972 Buffalo Creek Dam failure. Safety factors computed by the finite-element method (FEM) were compared with those computed by the Bishop limiting-equilibrium method. For individual slip circles, there was little correlation between the factors of safety computed by the two methods. Both predicted failure, but FEM shows a different mode of failure plus development of potential failure zones not indicated by conventional methods. Besides having a better theoretical basis than the Bishop method, FEM requires no assumptions regarding the location or geometry of the failure surface. As a result, the program will show progressive development of a failure zone, and areas can be pinpointed where remedial measures should be taken. In addition, nonhomogeneous cross sections can be analyzed, and zones of potential piping can be defined. (Sims-ISWS)
W77-02502

AN EXPERIMENTAL HIGH-ASH PAPER MILL SLUDGE LANDFILL: SECOND ANNUAL REPORT,
Michigan State Univ., East Lansing. Div. of Engineering Research.
For primary bibliographic entry see Field 5E.
W77-02555

AN EXPERIMENTAL HIGH-ASH PAPER MILL SLUDGE LANDFILL: FIRST ANNUAL REPORT,
Michigan State Univ., East Lansing. Div. of Engineering Research.
For primary bibliographic entry see Field 5E.
W77-02556

8E. Rock Mechanics and Geology

THURROCK BEATS PEAT WITH PILED PIPES,
B. Appleton.
New Civil Engineer, Vol. 19, No. 207, p 24, August, 1976.

Descriptors: *Sewers, *Construction, *Design criteria, *Peat, *Piles(Foundation), Hydraulic structures, Conveyance structures, Foundation failure, Foundations, Pipes, Geology, Conduits.

The installation of new sewers supported by piles in an area where old sewers were adversely affected by peat layers up to 11 meters deep which overlay weathered chalk is described. Piling was decided upon since any form of conventional bedding would eventually settle unevenly as the peat alternately swelled and shrank with movements in the water table. Construction was simplified by selecting just two pile spacings (5 m and 10 m), two pipe diameters (300 mm and 450 mm), and a constant beam depth (1 m). Beam widths were 600 mm for the smaller pipe diameter and 750 mm for the larger pipes. The problem of supporting the pipe inside a reinforcement cage during concreting was solved by using a Williams form tie fastened at one end to a circular clamp around the pipe and at the other end to a worm thread adjuster clamped to a modified horizontal Acrow prop. Spaced at 1.2 m centers, the brackets allowed any deflection of the pipe to be corrected during concreting. (Kreager-FIRL)
W77-02328

8F. Concrete

PRECAST SEGMENTS SPEED INSTALLATION OF THUNDER BAY SEWER,
Engineering and Contract Record, Vol. 89, No. 10, p 22-23, October, 1976.

Descriptors: *Sewers, *Tunneling, *Construction, *Concrete pipes, *Hydraulic structures, Municipal wastes, Conveyance structures, Materials, Canada
Identifiers: Thunder Bay(Ont).

The use of non-reinforced precast concrete segments for an 85-inch diameter section of the Neebing-McIntyre sanitary trunk sewer in Thunder Bay, Ontario is reported. The main advantage of the system is that both the primary lining and secondary poured concrete section usually used in soft ground are replaced by a one-step installation of segments. One tunnel ring consists of four segments, each 4.33 in thick, 39.3 in long, and weighing 1000 pounds. They are erected by a mechanical arm attached to a 97-inch mole. The rate of advance is as much as 50 ft of finished tunnel per 8-hour shift. Materials handling is essentially the same as in conventional tunneling systems. One major difference is that the segments are considerably larger, and it is thus necessary to exercise greater care to ensure that they do not obstruct the tunnel passageway or foul the conveyor support assembly. (Kreager-FIRL)
W77-02330

DIGESTION IS A GOOD EGG IN LOS ANGELES,
For primary bibliographic entry see Field 5D.
W77-02365

8G. Materials

KAISER EFFECT IN SNOW,
Montana State Univ., Bozeman.
For primary bibliographic entry see Field 2C.
W77-02154

LOCK WALL DEICING WITH WATER JETS: FIELD TESTS AT SHIP LOCKS IN MONTREAL, CANADA AND SAULT STE. MARIE, MICHIGAN,
National Research Council of Canada, Ottawa (Ontario). Div. of Mechanical Engineering; and National Research Council of Canada, Ottawa (Ontario). Gas Dynamics Lab.
For primary bibliographic entry see Field 8C.
W77-02156

FOURTH SEMIANNUAL INTERAGENCY BRIEFING, FEBRUARY 1975, WASHINGTON, D.C.,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Environmental Effects Lab.
R. T. Saucier, and M. K. Vincent.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A017 556, Price codes: A06 in paper copy, A01 in microfiche. Miscellaneous Paper D-75-14, 112 p, October 1975. 2 append.

Descriptors: *Dredging, *Coastal marshes, *Projects, *Disposal, Engineering geology, Coasts, Coastal engineering, Coastal plains, Marsh management, Marsh plants, Research and development, On-site investigations, Laboratory tests.
Identifiers: *Dredged material, Disposal operations project, Reuse research, Containment, Artificial marsh creation.

Presented are edited texts and prints of slides of the February 1975 briefing on the status of the Dredged Material Research Program (DMRP) that took place at the United States Army Engineer Waterways Experiment Station, Vicksburg, Mississippi. This was the largest and most diverse environmental research program undertaken to that time by the Corps, and it held the highest priority of any research effort at the Waterways Experiment Station. The briefing summarized the operation, organization, management, and funding of the DMRP and highlighted the issues of dredging and disposal. Research problems, accomplishments, and objectives were discussed in relation to work units within the four projects that structure the DMRP: the Aquatic Disposal Project, the Habitat Development Project, the Disposal Operations Project, and the Productive Uses Project. In February 1975, the DMRP was 40% completed with 37 work units finished and 56 active. The work unit studies, which covered a diversity of problems on the disposal, effects of disposal, and possible uses of dredged material, were conducted in laboratory and field investigations under contract with universities, corporations, and Government agencies throughout the United States. (Roberts-ISWS)
W77-02158

TEST NEW SEWERS WITH LOW-PRESSURE AIR,
W. S. Foster.
American City and County, Vol. 91, No. 10, p 102, October, 1976.

Descriptors: *Sewers, *Construction, *Testing procedures, *Pressure, *Hydraulic structures, Conduits, Conveyance structures, Pipes.

A low-pressure air test for determining the integrity of newly constructed sewers is described. Under the test procedure, the sewer line should be flushed and cleaned with the interior walls moist. The line should be plugged, including the laterals and outlets. Air under pressure is then introduced to a point where the pressure at the test line registers 4.0 pounds/sq in and is then allowed to stabilize until it reaches a figure of 3.5 pounds/sq in or slightly above. The pressure drop over a specified test period is then recorded; if the pressure drop more than 1 pound/sq in, the line has failed. The specified test period is determined by the following equation: test time equals (0.085 times the nominal inside pipe diameter)/permissible air loss per sq ft of internal pipe surface. The test time is established on an allowable air loss of 0.003 cu ft/min per sq ft of internal pipe surface with the following restrictions: minimum significant air loss is 2.0 cu ft/min and maximum total allowable air loss is 3.5 cu ft/min. Sewers should be air tested before and after backfill in order to assess the integrity of the installed material and the construction procedures. (Kreager-FIRL)
W77-02329

PLASTIC LINING OVERCOMES RUGGED TERRAIN,
Bement, Dainwood and Sturgeon, San Diego, Calif.
J. F. Dainwood.
Public Works, Vol 107, No 9, p 100-101, September, 1976.

Descriptors: *Sewers, *Repairing, *Plastic pipes, *Hydraulic structures, *Drainage systems, Conduits, Conveyance structures, Cities, Materials, Construction, Costs, California.
Identifiers: La Mesa(Calif).

The use of plastic lining to overcome exfiltration and infiltration problems associated with a 55-year-old, 6-inch concrete sewer line running through rocky terrain in the city of La Mesa, California is described. The repair project involved pulling heat-fused lengths of flexible polyethylene pipe (inside diameter of 4.75 in) through the old line. The pipe was supplied to the job-site in 38-foot sections and heat-fused in lengths necessary to extend from the lead-in pit to pull point. Lateral connections were made with polyethylene plastic saddles and jointed to the existing lateral with mechanical couplings. Manhole-main connections were made with a special grout and existing manholes were not damaged. The city elected to manage the work itself, contracting out only those portions of the project which their own forces could not handle. The final cost to complete the project was $40,000 for the 3400-foot sewer run. (Kreager-FIRL)
W77-02333

EMERGENCY REPAIR OF A DEEP STORM SEWER LINE,
D. M. Weis.
Public Works, Vol. 107, No. 9, p 76-77, September, 1976. 3 fig.

Descriptors: *Sewers, *Repairing, *Storm water, Concrete structures, *Hydraulic structures, Materials, Linings.

The emergency repair of a 60-inch monolithic concrete storm sewer in imminent danger of collapse is described. The sewer discharges into Lake Michigan, emerging from a bluff in a head wall a short distance from the shore line. A slippage had occurred along the face of the bluff about 110 ft inland from the head wall and extended laterally about 600 ft. This resulted in a shear failure in the sewer along the apparent fault line of the slippage. The existence of the fault was unsuspected until the face of the 90-foot high bluff suddenly dropped a total of 2 ft at the rate of 3-6 in/day. Temporary repair of the sewer with a 48-inch diameter, 3/8 in steel liner plate was performed. Sections of the liner were assembled on the outfall apron, attached to a cable extending through 287 ft of sewer and up to a manhole where a crane could pull the completed pipe or liner into place at the point of the break. A gap of about 1.5 in at the joint of the lapped section was closed by welding. A concrete transition section was poured to anchor the liner, and the front 20 ft was grouted with mortar. A bulkhead was made at the lake end to hold the pea gravel. The remaining annular space was filled with pea gravel or torpedo sand. (Kreager-FIRL)
W77-02350

PACKAGED PLANT FOR VIRGIN ISLANDS.
Water and Waste Treatment, Vol. 19, No. 7, p 22, July, 1976.

Descriptors: *Sewage treatment, *Treatment facilities, *Plastics, *Activated sludge, *Biological treatment, Materials, Construction, Equipment, Design criteria, Aeration, Virgin Islands.

The largest complete sewage treatment plant manufactured out of glass fiber reinforced plastics in the United Kingdom is described. The plant operates by the extended aeration activated sludge process and is capable of serving a population of 500 people. The plant is designed to treat a domestic sewage dry weather flow of 25,000 gallons/day. It consists of a rectangular glass fiber reinforced plastic tank, 11 m by 6 m by 3.5 m, divided into an aeration chamber and a settling chamber of the upward flow type. An adjustable weir controls the overflow rate in the settling chamber and ensures the quiescent conditions necessary for efficient settling. A scum removal system keeps the surface of the settling chamber free from floating solids. Particular advantages of the glass reinforced plastic construction are corrosion resistance and light weight which makes the plant easy to transport and simple to install. (Kreager-FIRL)
W77-02360

GLASS COATED STEEL TANKS.
Water and Waste Treatment, Vol. 19, No. 7, p 23, July, 1976.

Descriptors: *Storage tanks, *Waste water treatment, *Steel structures, *Coatings, *Construction, Materials, Equipment, Corrosion control.

The use of glass-coated steel plates for the construction of tanks used for the storage and treatment of water and waste water is reported. The plates are in standard sizes of 2,730 mm long by 1,445 mm high and in half plate sizes 2,730 mm long by 800 mm high. Each plate is sprayed with glass frit and fired at high temperature. The plates are lap jointed at vertical and horizontal seams with 58 mm lap at the vertical joints and 50 mm lap at the horizontal joints. All laps are sealed using a moisture curing sealant and are then bolted. The steel tanks are erected on reinforced concrete foundations. Tank sizes vary with diameters ranging from 2.558 m to over 30 m and heights ranging from 1.377 m to 11.155 m. The tanks are normally supplied open topped for effluent and water treatment, although coated steel roofs and reinforced butyl rubber debris covers can also be supplied for water and effluent storage. The tanks have a high resistance to corrosion and are simple to erect. (Kreager-FIRL)
W77-02361

SANDWICH CONSTRUCTION G.R.P.
Water and Waste Treatment, Vol. 19, No. 7, p 26, July, 1976.

Descriptors: *Plastics, *Sewage treatment, *Treatment facilities, *Equipment, *Materials, Settling basins, Construction.

The use of sandwich construction glass reinforced plastics in sewage treatment plant equipment is reported. Equipment constructed of glass reinforced plastic includes integral launders in sections fitted to form a circle within final settling tanks as well as similar launders installed in thickening tanks. Glass reinforced plastic offers the advantages of increased strength and a smooth surface which minimizes algal growth. The material is also non-corrosive. (Kreager-FIRL)
W77-02368

ASSESSING SYNTHETIC AND ADMIXED MATERIALS FOR LINING LANDFILLS,
Matrecon, Inc., Oakland, Calif.
For primary bibliographic entry see Field 5E.
W77-02410

THE BEARING CAPACITY OF FLOATING ICE PLATES SUBJECTED TO STATIC OR QUASI-STATIC LOADS,
Princeton Univ., N. J. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2C.
W77-02460

THE APPLICATION OF FRACTURE MECHANICS TO THE PROBLEM OF CREVASSE PENETRATION,
Cambridge Univ., (England). Dept. of Engineering.
For primary bibliographic entry see Field 2C.
W77-02461

SNOW PRESSURE ON RIGID OBSTACLES,
Washington Univ., Seattle. Geophysics Program.
For primary bibliographic entry see Field 2C.
W77-02463

8I. Fisheries Engineering

SWIMMING OF SLENDER FISH IN A NON-UNIFORM VELOCITY FIELD,
Massachusetts Inst. of Tech., Cambridge. Dept. of Ocean Engineering.
For primary bibliographic entry see Field 2L.
W77-02155

9. MANPOWER, GRANTS AND FACILITIES

9A. Education (Extramural)

WATER RESOURCE PROBLEMS AND RESEARCH NEEDS OF NORTH CAROLINA,
North Carolina Water Resources Research Inst., Raleigh.
For primary bibliographic entry see Field 9D.
W77-02181

9D. Grants, Contracts, and Research Act Allotments

WATER RESOURCE PROBLEMS AND RESEARCH NEEDS OF NORTH CAROLINA,
North Carolina Water Resources Research Inst., Raleigh.
D. H. Howells.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 475, Price codes: A03 in paper copy, A01 in microfiche. Report No. 2 (Revised 7/1/76), July 1, 1976, 39 p. OWRT A-999-NC(49), 14-34-0001-6034.

Descriptors: *Research priorities, Water resources, Conservation, Planning, Pollution abatement, Groundwater, Surface water, *Research and development, *North Carolina, *Education, Training, Colleges, *Universities, Government support, State governments.
Identifiers: *Water resource problems, *Water resource research needs.

A summary of North Carolina's water resource problems and research needs was prepared as a source of orientation for the North Carolina Water Resources Research Institute's research program. The subject matter is presented within the broad categories of water resource planning, water quality management, and water quantity management. The problems and needs discussed represent those areas in which the Institute is attempting to encourage a research response from potential investigators. Current and needed studies and research referred to reflect the collective statewide effort of public agencies, industry, and the university community. Seventy-three priority research needs are identified. (Kiger-North Carolina State)
W77-02181

10. SCIENTIFIC AND TECHNICAL INFORMATION

10C. Secondary Publication And Distribution

EVALUATION OF THE RING OVEN TECHNIQUE FOR WATER MONITORING, APPENDICES,
Atlantic Research Corp., Alexandria, Va.
For primary bibliographic entry see Field 5A.
W77-02149

ACID MINE DRAINAGE (A BIBLIOGRAPHY WITH ABSTRACTS),
National Technical Information Service, Springfield, Va.
For primary bibliographic entry see Field 5G.
W77-02207

MAINE RIVERS BIBLIOGRAPHY- A USER'S MANUAL,
Research Inst. of the Gulf of Maine, Portland.
R. Harvey, M. W. Hall, P. D. Uttormark, and M. M. Brady.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 495, Price codes: A02 in paper copy, A01 in microfiche.
Maine Land and Water Resources Institute, Orono, Completion Report, October 1976. 12 p. OWRT A-038-ME(1).

Descriptors: *Rivers, *Bibliographies, *Maine, *Streams, *Estuaries, Groundwater, Hydrology, Meteorology, Erosion, Floods, Navigation, Oceanography, Wildlife, Dams, Water supply, Water quality, Fisheries, History, Recreation, Wetlands, Geology, Soils, Dredging, Diversion.

This User's Manual is a companion volume to the Maine Rivers Bibliography and explains bibliography development, its use, and where to obtain materials once they are identified. An introductory section describes and evaluates the original project objectives and their attainment. The collection method is then explained. Accompanying tables detail accept-reject criteria and nationally available document data bases. The bibliography description covers the structure of the individual citations - author, title, source, and code sections - and how a microfiche published Keyword in Context (KWIC) Index, consisting of Keyword Index, Author Index, and Citation Section, can be used. Approximately 4500 citations are indexed. Accompanying tables detail identification codes - sector, source type, time, disciplines, locations - and give samples from the three sections of the KWIC Index. A final tabular presentation lists organizational information sources, the general kinds of information held, and the forms in which they are kept. An appendix contains technical notes on the computer program used to generate the index. The Maine Rivers Bibliography is available on microfiche for a nominal charge from the Environmental Studies Center, University of Maine at Orono.
W77-02224

BIBLIOGRAPHY OF SOVIET LITERATURE ON FRESHWATER HYDROBIOLOGY AND RELATED PROBLEMS: 1974-1975 (ISSUE 19), (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
For primary bibliographic entry see Field 02I.
W77-02232

ECONOMIC IMPACTS OF WEATHER VARIABILITY,
Missouri Univ., Columbia. Dept. of Atmospheric Science.
For primary bibliographic entry see Field 03B.

W77-02429

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- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

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- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
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- Municipal wastewater treatment technology at the Franklin Institute Research Laboratories.

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A Semimonthly Publication of the Water Resources Scientific Information Center, Office of Water Research and Technology, U.S. Department of the Interior

U. OF I. URBANA-CHAMPAIGN

VOLUME 10, NUMBER 6
MARCH 15, 1977

W77-02576 -- W77-03075

Secretary of the U.S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into 10 fields and 60 groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on the inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the Bio-Science Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
Washington, DC 20240

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Includes the following Groups: Properties; Aqueous Solutions and Suspensions

02 WATER CYCLE
Includes the following Groups: General; Precipitation; Snow, Ice, and Frost; Evaporation and Transpiration; Streamflow and Runoff; Groundwater; Water in Soils; Lakes; Water in Plants; Erosion and Sedimentation; Chemical Processes; Estuaries

03 WATER SUPPLY AUGMENTATION AND CONSERVATION
Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

04 WATER QUANTITY MANAGEMENT AND CONTROL
Includes the following Groups: Control of Water on the Surface; Groundwater Management; Effects on Water of Man's Nonwater Activities; Watershed Protection

05 WATER QUALITY MANAGEMENT AND PROTECTION
Includes the following Groups: Identification of Pollutants; Sources of Pollution; Effects of Pollution; Waste Treatment Processes; Ultimate Disposal of Wastes; Water Treatment and Quality Alteration; Water Quality Control.

06 WATER RESOURCES PLANNING
Includes the following Groups: Techniques of Planning; Evaluation Process; Cost Allocation, Cost Sharing, Pricing/Repayment; Water Demand; Water Law and Institutions; Nonstructural Alternatives; Ecologic Impact of Water Development

07 RESOURCES DATA
Includes the following Groups: Network Design; Data Acquisition; Evaluation, Processing and Publication.

08 ENGINEERING WORKS
Includes the following Groups: Structures; Hydraulics; Hydraulic Machinery; Soil Mechanics; Rock Mechanics and Geology; Concrete; Materials; Rapid Excavation; Fisheries Engineering.

09 MANPOWER, GRANTS, AND FACILITIES
Includes the following Groups: Education—Extramural; Education—In-House; Research Facilities; Grants, Contracts, and Research Act Allotments.

10 SCIENTIFIC AND TECHNICAL INFORMATION
Includes the following Groups: Acquisition and Processing; Reference and Retrieval; Secondary Publication and Distribution; Specialized Information Center Services; Translations; Preparation of Reviews.

SUBJECT INDEX

AUTHOR INDEX

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ACCESSION NUMBER INDEX

ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

1. NATURE OF WATER

1B. Aqueous Solutions and Suspensions

HETEROGENEOUS SENSITIZED DECOMPOSITION OF WATER WITH SUNLIGHT,
Exxon Research and Engineering Co., Linden, N.J.
For primary bibliographic entry see Field 2K.
W77-02819

2. WATER CYCLE

2A. General

URBAN HYDROLOGICAL MODELING AND CATCHMENT RESEARCH IN CANADA,
Canada Centre for Inland Waters, Burlington Ontario).
. Marsalek.
Reprint of Technical Memorandum No IHP-3, ASCE Urban Water Resources Research Program, American Society of Civil Engineers, New York, N.Y. June 1976; Technical Bulletin No 98, 976. 52 p, 6 fig, 7 tab, 58 ref, 2 append.

Descriptors: *Canada, *Hydrology, *Model studies, Sewers, Urban runoff, Flow, Land use, Data collections, Planning, Storm runoff, Urbanization, Watersheds(Basins), Effects, Monitoring, Overflows, Waste water treatment, Design storm, On-site data collections.
Identifiers: Runoff quality, Undesirable trends, Urban watersheds.

Results of a critical survey of urban test catchment research and urban hydrological modelling in Canada are presented. A catalogue of selected urban test catchments and related research projects was prepared. Information on catchment characteristics, instrumentation, data acquired, analysis performed and data applications was included. The Section on Urban Hydrological Modeling includes descriptions of newly developed models, modifications and refinements of some existing models and selected Canadian engineering applications of urban runoff models. There is a lack of urban runoff data or on-site data collections in Canada. It is recommended that more data collections be made to verify non-calibrated model results. (Environment Canada)
W77-02754

URBAN DRAINAGE MODEL COMPARISON FOR A CATCHMENT IN HALIFAX, NOVA SCOTIA,
Nova Scotia Technical Coll., Halifax.
. H. Waller, W. A. Coulter, W. M. Carson, and . G. Bishop.
Canada-Ontario Agreement on the Great Lakes Water Quality, Research Report No. 43, Environmental Protection Service, Environment Canada, Ottawa, Canada, August 1976, 35p., 25 fig., 6 tab, ref. 74-8-2.

Descriptors: *Urban runoff, *Rainfall, *Data collections, *Model studies, Storm runoff, Flows, Hydrographs, Costs, Watersheds(Basins), Canada, *Urban drainage, Watershed management.
Identifiers: *Halifax, Nova Scotia, Road Research Laboratory(RRL) Model, United Kingdom, Storm Water Mangement model.

Rainfall-runoff data were collected for a 167.2 acre combined sewer drainage area at Halifax, Nova Scotia. These data were used to compare the performance of the U.K. Road Research Laboratory (RRL) runoff model and the RUNOFF block of the U.S. Environmental Protection Agency Storm Water Management Model. Both models were capable of producing creditable results for a sewerage system that included surcharged pipes and yielded runoff from previous areas in major storms. Calculated peaks were generally earlier and higher than observed values. Agreement improved with the magnitude of storm events. Hydrographs from the models were more similar than were calculated and observed results, especially in larger storm events. The EPA RUNOFF block required more computer time than the RRL model. (Environment Canada)
W77-02764

EFFECTS OF MAN ON THE INTERFACE OF THE HYDROLOGICAL CYCLE WITH THE PHYSICAL ENVIRONMENT.
For primary bibliographic entry see Field 4D.
W77-02771

HYDROLOGY,
Geological Survey, Raleigh, N.C. Water Resources Div.
For primary bibliographic entry see Field 6B.
W77-02968

HYDRAULIC SIMULATION USING DISTRIBUTED PARAMETERS,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
L. F. Huggins, T. H. Podmore, and C. E. Hood.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 078, Price codes: A04 in paper copy, A01 in microfiche. Purdue University Water Resources Research Center, Technical Report No. 82, (1976). 59 p, 7 fig, 11 tab, 16 ref, append. OWRT A-027-IND(2).

Descriptors: *Rainfall-Runoff relationships, *Agricultural runoff, *Overland flow, *Agricultural watersheds, Runoff, Hydrographs, Infiltration, Rainfall intensity, Topography, Erosion control, Sediment yield, Hydraulic similitude, Hydraulic models, Model studies, Path of pollutants.
Identifiers: Distributed parameters, Surface retention, Groundwater percolation.

The distributed watershed model developed was based upon the premise that a watershed could be subdivided into a grid of square elements each sufficiently small in size that all hydrologically significant factors would be uniform within its boundaries. In addition to the resulting ability for simultaneously quantifying the hydrologic performance of every point within the watershed being modelled, this approach allows the use of plot and laboratory data to develop model parameters. A laboratory flow table was constructed which provided simulated rainfall and overland flow on full-scale watershed elements representative of various surfaces. This apparatus was used to study flow over three 'uniformly rough' surfaces created from various sand and gravel-sized particles. A radio telemetry system was designed for the collection of data in the field. Research was directed toward the following objectives (1) development of a parametric relationship between overland flow rate, average flow depth, hydraulic roughness and average slope; (2) evaluation of various techniques to quantify physical surface roughness; and (3) correlation of physical roughness parameters with hydraulic roughness coefficients. The distributed parameter watershed models offer significant advantages to the more conventional lumped models for small watershed and is especially valid for applications related to non-point source pollution. (Wiersma-Purdue)
W77-03001

2B. Precipitation

NOAA'S ACTIVITIES IN ENERGY RELATED MEASUREMENT AND MONITORING,
National Oceanic and Atmospheric Administration, Rockville, Md.
For primary bibliographic entry see Field 5G.
W77-02652

ESTIMATION OF DAILY PRECIPITATION OVER CHINA AND THE USSR USING SATELLITE IMAGERY,
National Environmental Satellite Service, Washington, D. C.
W. A. Follansbee.
NOAA Technical Memorandum NESS 81, September 1976. 33 p, 20 fig, 5 tab, 6 ref.

Descriptors: *Precipitation(Atmospheric), *Clouds, *Meteorological data, Model studies, Rain, Storms, *Asia.
Identifiers: *China, *USSR, Satellite imagery, Infrared imagery, Data analysis.

A technique for estimating precipitation over China and the USSR in late autumn, winter, and early spring, using satellite data is described. The data consisted of NOAA-4 infrared imagery taken at approximately 9 a.m. and 8 p.m., local time, and visual pictures taken near 9 a.m. local time, all with one-half mile resolution. The major human input to the technique is identification of precipitating clouds in the infrared imagery, aided by inspection of the visual pictures. The technique consists of three steps: delineate the area(s) covered by precipitating clouds in each of two consecutive infrared images taken at approximately 12-hour intervals; using cloud motion models developed for the purpose, delineate the envelope of precipitation and isopleths of duration of precipitation in hours; and using an empirically derived relationship between duration of precipitation and the percentage of monthly normal precipitation, estimate amounts of precipitation for the 12-hour period at each grid point in the area of interest. (NOAA)
W77-02663

ECONOMICS OF STORM PROTECTION,
Delaware Univ., Newark. Coll. of Marine Studies.
For primary bibliographic entry see Field 6F.
W77-02672

A SHEARED COORDINATE SYSTEM FOR STORM SURGE EQUATIONS OF MOTION WITH A MILDLY CURVED COAST,
National Weather Service, Silver Spring, Md. Techniques Development Lab.
C. P. Jelesnianski.
NOAA Technical Memorandum NWS TDL-61, July 1976. 56 p, 10 fig, 10 ref, 3 append.

Descriptors: *Storm surge, *Storms, United States, Coasts, Numerical analysis, Mathematical models, Equations.
Identifiers: *Storm tracks, *Tropical storms, *Sheared coordinate system, Equations of motion.

To improve numerical computations of coastal storm surges, a mildly curved coastline is shifted or sheared onto a straight 'baseline'. A surface plane, truncated from the ocean shelf and containing the curved coast as a boundary, is fitted with a curved, non-orthogonal grid. The plane with curved boundaries is then transformed via a sheared coordinate system onto an image rectangle. In the transformed system, the computational grid is cartesian, orthogonal, equally spaced, and the coast lies exactly on and not across a grid line. Linearized transport equations of motion for storm surges are modified to accommodate the sheared coordinate system. A surge model, incorporating the sheared system, is now fully opera-

tional for 3000 mi. of United States coasts, from the Mexican.American border in the Gulf of Mexico to the east end of Long Island, New York. The model can run with curvilinear storm tracks, changing storm celerity along the track, and changing storm parameters such as intensity and size. (NOAA)
W77-02674

RECONSTRUCTION OF SOME OF THE EARLY STORM SURGES ON THE GREAT LAKES,
Department of the Environment, Ottawa (Ontario). Ocean and Aquatic Affairs.
For primary bibliographic entry see Field 2H.
W77-02797

OPTIMAL RAINGAGE DENSITIES AND ACCUMULATION TIMES: A DECISION-MAKING PROCEDURE,
Oklahoma Univ., Norman. Dept. of Meteorology.
A. Eddy.
Journal of Applied Meteorology, Vol 15, No 9, p 962-971, September 1976. 12 fig, 3 ref. Bu. Rec. 14-060-D-7633.

Descriptors: *Rainfall, *Rain gages, *Networks, *Illinois, Network design, Data processing, Model studies, Mathematical models, Measurement, Rain, Precipitation(Atmospheric), Analytical techniques, Meteorology.
Identifiers: Raingage densities, Accumulation times.

The requirement addressed by this study is that of estimating the rainfall over a given area within a given accuracy. Decision criteria were given explicitly, historical data sets were used to obtain the necessary statistics, an optimal interpolation objective analysis (x,y,t) was used to estimate the rainfall, and specific gage density and accumulation times were deduced. Some of the hazards associated with the modeling were discussed. (Sims-ISWS)
W77-02798

ACID PRECIPITATION,
Cornell Univ., Ithaca, N.Y. Section of Ecology and Systematics.
G. E. Likens.
Chemical and Engineering News, Vol. 54, No. 48, p 29-44, November 22, 1976. 19 ref.

Descriptors: *Chemistry of precipitation, *Precipitation(Atmospheric), *Hydrogen ion concentration, Rainfall, Snowfall, Acidity, Acidic water, Lakes, Aerosols, Fish, Pollutants, Air pollution, Air pollution effects, Path of pollutants, Water pollution , Water pollution sources, Sulfur, Nitrogen, Fossil fuel, Chemistry, Meteorology.
Identifiers: *Acid precipitation.

The acidity of rain and snow falling on widespread areas of the world has been rising during the past two decades or so. The consequences of this phenomenon have yet to be fully evaluated, but acid precipitation clearly seems to have had a far-reaching environmental impact. It has been linked to sharp declines--in some cases to the point of total extinction--in the number of fish in many lakes and streams. Evidence also suggests that acid rain, snow, and aerosol particles may be damaging trees and other plants. In addition, the increased acidity enhances the weathering and corrosion of materials and buildings. Some scientists also suggest that acid aerosols are an added threat to human health. Nevertheless, there is still considerable disagreement about the sources for the acid-forming components and about the severity of the effects. The long-run social and economic problems associated with acid precipitation and its control are particularly complex and vexing since rain and snonw are not confined by existing political boundaries. To explore these problems and to get a clearer picture of the cause and effect of acid precipitation, research activity has recently blossomed in the U.S. and aboard. The results of this research were reviewed in this paper. (Sims-ISWS)
W77-02800

THE MEASUREMENT AND ESTIMATION OF POTENTIAL EVAPOTRANSPIRATION,
SCITRAN, Santa Barbara, Calif.
For primary bibliographic entry see Field 2D.
W77-02802

MICROCLIMATIC PATTERNS ON THE ARID LANDS ECOLOGY RESERVE,
Northwest Coll. and Univ. Association for Science, Richland, Wash.
J. T. Rotenberry, W. T. Hinds, and J. M. Thorp.
Northwest Science, Vol 50, No 2, p 122-130, 1976. 4 fig, 4 ref.

Descriptors: *Microclimatology, *Arid lands, Climatology, Mathematical models, *Washington, Climates, Climatic data, Meteorology, Weather data, Precipitation(Atmospheric), Rainfall, Deserts, Isohyets, Isotherms, *Micrometeorology, Correlation analysis, Mathematical studies, Ecosystems.

Within zonal climates, which are determined by latitude, distance from oceans, and elevation, lie a multitude of microclimates which are largely distinguished by localized differences in slope, exposure, elevation and local topography. Plants and animals usually are adapted to the zonal climates, but they must live in or avoid the microclimates. Cluster analysis of correlation coefficients is employed to detect microclimatic patterns within a 27-station network in a topographically diverse region of southeastern Washington. The data consist of monthly precipitation and maximum and minimum temperatures. A mathematical model was employed to determine the similarity in pattern between any two stations. Precipitation patterns showed the greatest variability of the three measures considered. The analyses show that patterns of temperature and precipitation may produce significantly different microclimatic patterns. Further research in relating microclimates to landscapes and plant community structure to the various microclimatic variables or clusters that have been measured is suggested. (Jamail-Arizona)
W77-02870

COLORADO RIVER BASIN PILOT PROJECT, COMPREHENSIVE EVALUATION REPORT, FIVE WINTER SEASONS 1970-71 TO 1974-75,
Aerometric Research Inc., Goleta, Calif.
For primary bibliographic entry see Field 3B.
W77-03060

2C. Snow, Ice, and Frost

AN ANALYSIS OF GREAT LAKES ICE COVER FROM SATELLITE IMAGERY,
National Oceanic and Atmospheric Administration, Ann Arbor, Mich. Great Lakes Environmental Research Lab.
B. B. Hagman.
NOAA Technical Memorandum ERL GLERL-9, April 1976. 15 p, 3 ref, 5 tab, 2 fig.

Descriptors: *Great Lakes, *Ice cover, *Remote sensing, Reflectance, Measurement.
Identifiers: *Satellite imagery, *Navigation season, Surface reflectance.

Remotely sensed satellite data present a synoptic view of the distribution and extent of the Great Lakes ice cover. Although there are several reasons for extracting ice-cover information from satellite imagery, the major reason is the desire to extend the navigation season on the Great Lakes. One method of obtaining this type of information is to measure satellite transparency density a then correlate calculated surface reflectance w ice-cover concentration. But the use of tra parencies presents several difficulties, such as t problem of variable film densities. Because of t variability inherent in satellite transparencies a inaccurate ground verification data, it is desira to find a better method of extracting ice-cover formation. (NOAA)
W77-02676

GREAT LAKES ICE COVER, WINTER 1974-7
National Oceanic and Atmospheric Administ tion, Ann Arbor, Mich. Great Lakes Environm tal Research Lab.
G. A. Leshkevich.
NOAA Technical Report ERL 370-GLERL March 1976. 43 p, 29 fig, 2 ref, append. Also GLERL Contribution No. 78.

Descriptors: *Great Lakes, *Ice co *Meteorological data, *Iced lakes, *Lake *Weather data, Data processing, Charts, Clim data.
Identifiers: *Ice charts.

From ice-cover data received at the Great La Environmental Research Lab. during the winter, twenty composite ice charts w produced to illustrate estimated ice distributi and concentrations on the Great Lakes at wee intervals from mid-December, 1974, through end of April, 1975. Freezing degree-day accum tions indicate that the 1974-75 winter was near mal for Lakes Superior, Michigan, and Huron, between mild and normal for Lakes Erie and tario. Accumulations were near their seas maximum near mid-April on northern portion the Great Lakes and at mid-March on south portions. Skim ice was reported in late Novem but it wasn't until near mid-January that rapid extensive ice growth took place. Ice growth c tinued through mid-February, when ice co reached their maximum extent on all the lakes the exception of Lakes Superior and Onta where they occurred near mid-March. Maxim ice extent was estimated to be 30% on Lake perior, 25% on Lake Michigan, 45% on L Huron, 80% on Lake Erie, and 16% on Lake tario. Warmer temperatures during the latter of February caused significant loss of ice on a the lakes. Last reports of ice on the northern l came during the latter part of April. (NOAA)
W77-02677

WINTER RUNOFF FROM AN UR CATCHMENT, (JANUARY TO MARCH 1974
Nova Scotia Technical Coll., Halifax. Dept Civil Engineering.
For primary bibliographic entry see Field 4C.
W77-02739

BEHAVIOUR OF OIL SPILLED IN COVERED RIVERS,
Department of the Environment, Ott (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 5B.
W77-02760

STRAIN RATE EFFECT ON THE STRENG OF FROZEN SILT,
Cold Regions Research and Engineering L Hanover, N.H.
For primary bibliographic entry see Field 8D.
W77-02804

ICE FLUSHING FROM ST. LAWRE SEAWAY LOCKS; HYDRAULIC MODEL VESTIGATION,
Army Engineer Waterways Experiment Sta Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02953

2D. Evaporation and Transpiration

THE MEASUREMENT AND ESTIMATION OF POTENTIAL EVAPOTRANSPIRATION,
SCITRAN, Santa Barbara, Calif.
U. Wendling.
NASA Technical Translation F-16, 671, December 1975. 25 p, 4 fig, 6 tab, 21 ref. Translated from Zur Nessung und Schatzung der potentiellen Verdunstung, Zeitschrift fur Meteorologie, Vol. 25, No. 2, p 103-111, 1975.

Descriptors: *Evapotranspiration, *Forest watersheds, *Measurement, *Instrumentation, Estimating, Reservoirs, Formulation, Meteorological data, Precipitation(Atmospheric), Groundwater, Equation, Probability.
Identifiers: *Potential evapotranspiration, *Thornthwaite, *Turc, Evapotranspiration instrument, Formulas, Forested land.

Values of potential evapotranspiration, measured over 10 years by a Thornthwaite evapotranspiration instrument (modified by Mather), were compared with estimates made by various formulas. The method most suitable for the assessment of the potential evapotranspiration on the bsis of readily available meteorological data was the one by Turc, which provided values that were, on the average, lower by 6%. The evapotranspiration installation designed by Thornthwaite was based on maintaining a constant water content near the field capacity in a sufficiently large evaporation container filled with earth and covered with growing grass. In this study, a constant groundwater level adjusted itself in the evaporation container by means of a float system. Depending on the ratio of precipitation and evaporation, a certain amount of water flowed in or out past valves and could be measured. (Roberts-ISWS)
W77-02802

STRUCTURAL COMPOSITION AND SOME PROBLEMS OF THE WATER REGIME OF DARK-CHESTNUT SOILS OF THE KUSTANAI OBLAST IN CONNECTION WITH THE DURATION OF THEIR CULTIVATION, (IN RUSSIAN),
For primary bibliographic entry see Field 2G.
W77-02853

COMPARISON OF IRRIGATION SCHEDULES BASED ON PAN EVAPORATION AND GROWTH STAGES IN WINTER WHEAT,
Punjab Agricultural Univ., Ludhiana (India).
For primary bibliographic entry see Field 3F.
W77-02857

COMPARATIVE MORPHOLOGICAL AND ECOPHYSIOLOGICAL ASPECTS OF TWO SCLEROPHYLLOUS CHILEAN SHRUBS,
Universidad Catolica de Chile, Santiago. Laboratorio de Botanica; and Universidad Catolica de Chile, Santiago. Inst. of Biological Sciences.
For primary bibliographic entry see Field 3B.
W77-02858

CONSERVING WATER BY ANTITRANSPIRANT TREATMENT OF PHREATOPHYTES,
California Univ., Davis. Water Science and Engineering Section.
For primary bibliographic entry see Field 3B.
W77-02863

A COMPARATIVE STUDY OF THE EFFECT OF SOIL MOISTURE ON THE GROWTH AND TRANSPIRATION OF CERTAIN POPLAR FORMS, (IN BULGARIAN),
Forest Research Inst., Sofia (Bulgaria).
For primary bibliographic entry see Field 2I.
W77-02886

2E. Streamflow and Runoff

RESISTANCE EQUATION FOR ALLUVIAL-CHANNEL FLOW,
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 8B.
W77-02971

SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70: PART 1. NORTH ATLANTIC SLOPE BASINS--VOLUME 2. BASINS FROM NEW YORK TO DELAWARE.
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-02980

SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70: PART 11. PACIFIC SLOPE BASINS IN CALIFORNIA--VOLUME 3. SOUTHERN CENTRAL VALLEY BASINS.
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-02981

2F. Groundwater

MARYLAND UPLANDS NATURAL AREAS STUDY. VOL I: EASTERN SHORE,
Rogers and Golden, Inc., Philadelphia, Pa.
For primary bibliographic entry see Field 2L.
W77-02690

MARYLAND UPLANDS NATURAL AREAS STUDY. VOL II: EASTERN SHORE FIELD NOTEBOOK,
Rogers and Golden, Inc., Philadelphia, Pa.
For primary bibliographic entry see Field 2L.
W77-02691

FINITE-STATE MODELS OF TRANSPORT PHENOMENA IN HYDROLOGIC SYSTEMS,
Arizona Univ., Dept. of Hydrology and Water Resources.
M. E. Campana.
Ph.D. Dissertation, 1975. 252 p, 20 fig, 28 tab, 73 ref, 2 append.

Descriptors: *Sediment transport, *Hydrologic systems, *Aquifer systems, *Model studies, Steady flow, Unsteady flow, Texas, Arizona.
Identifiers: *Finite-state models, *Transport models, *Mixing-cell models, Tucson Basin Aquifer, Edwards Limestone Aquifer(Texas).

Two aquifer systems are analyzed using finite-state models (FSMs) which simulate transport phenomena in hydrologic systems. The FSM involves a mixing cell as the basic subdivision but is more flexible than a mixing-cell model in that it can describe more complex systems and is easier to manipulate. The two models are described and compared and distribution functions of the FSM are outlined. A three-dimensional steady-flow FSM is used to account for observed carbon-14 age distribution in a portion of the Tucson Basin Aquifer, without assuming piston flow in the aquifer or evaluating dispersion parameters. This model provides a first approximation of three-dimensional flow distribution, an estimate of long-term average annual recharge, and fluid residence times in the aquifer. A two-dimensional and non-steady flow FSM is used to account for transient tritium distribution in the Edwards Limestone aquifer of south-central Texas. The aquifer is highly anistropic and nonhomogeneous karst, ordinarily difficult to model. The FSM can simultaneously model mass and fluid transport in a hydrologic system, and has the potential for modeling heat transport. (Jahns-Arizona)
W77-02865

DIGITAL-SIMULATION MODEL OF THE WENONAH-MOUNT LAUREL AQUIFER IN THE COASTAL PLAIN OF NEW JERSEY,
Geological Survey, Trenton, N. J. Water Resources Div.
B. Nemickas.
Open-file report 75-672, January 1976. 42 p, 20 fig, 3 tab, 28 ref.

Descriptors: *Computer models, *Aquifer characteristics, *Drawdown, *Hydrologic properties, *New Jersey, Coastal plains, Leakage, Groundwater movement, Transmissivity, Aquitards.
Identifiers: *Wenonah-Mount Laurel aquifer(NJ).

A digital computer simulation model of the Wenonah-Mount Laurel aquifer is used to evaluate the aquifer's ability to meet projected future demands and to study the cause of the rapidly declining water levels. The modelled area covers 1,500 square miles of the New Jersey Coastal Plain. All important pumping centers in Monmouth, Burlington, and Ocean Counties are included. The model was calibrated by matching computed declines in the Wenonah-Mount Laurel aquifer historic water-level declines over the 12-year period 1959-70. The results of the modelling show that recharge to the aquifer occurs from the upper confining unit due to pumpage from the aquifer and of equal significance is the effect of water-level declines in the underlying Englishtown aquifer which generate leakage from the Wenonah-Mount Laurel aquifer through the lower confining unit which in turn generates leakage (recharge) to the aquifer from the upper confining unit. The rapid declines of water levels in the Wenonah-Mount Laurel aquifer in the northern part of the New Jersey Coastal Plain are caused by the direct withdrawals from the Wenonah-Mount Laurel aquifer and indirectly from the withdrawals from the underlying Englishtown aquifer. (Woodard-USGS)
W77-02975

AN APPRAISAL OF GROUND WATER FOR IRRIGATION IN THE APPLETON AREA, WEST-CENTRAL MINNESOTA,
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-02982

WATERLOGGING IN AN ALLUVIAL AQUIFER NEAR LAKE MINNEQUA, PUEBLO, COLORADO,
Geological Survey, Lakewood, Colo. Water Resources Div.
P. J. Emmons.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-258 560, Price codes: A06 in paper copy, A01 in microfiche. Water Resources Investigations 76-53, July 1976. 34 p, 6 fig, 4 plates, 4 tab, 12 ref.

Descriptors: *Colorado, *Alluvial aquifers, *Saturated soils, *Surface-groundwater relationships, Aquifers, Hydrogeology, Water storage, Lakes, Reservoirs, Seepage, Water table, Groundwater movement.
Identifiers: *Waterlogging, *Pueblo area(Colo).

The Lake Minnequa area, located immediately south of the Arkansas River near Pueblo, Colo., is mantled with as much as 46 feet (14 meters) of alluvium covering bedrock of Pierre Shale and Niobrara Formation. Surface water enters the area by the Minnequa Canal and the St. Charles Flood Ditch. The water is stored in Lake Minnequa and other reservoirs. Seepage from St. Charles Reservoirs No. 2 and No. 3 is the major source of water to the alluvial aquifer. The depth of the water table ranges from 0 to 40 feet (0 to 12.2 meters). An 0.5-square-mile (1.3-square-kilometer) area im-

U. S. Dept. of Int. URBANA-CHAMP...

mediately south of Lake Minnequa has a water table less than 6 feet (1.8 meters) below land surface. Lake Minnequa is the principal cause of the shallow water table and resulting waterlogged soil. The bedrock hill east of Lake Minnequa and ground-water flow also contribute to the problem. To eliminate the waterlogging problem, the water table would have to be at least 6 feet (1.8 meters) below land surface. Possible alternatives for eliminating the problem include lowering the water level in Lake Minnequa, placing a network of dewatering wells, or constructing a drainage system in the waterlogged area. (Woodard-USGS)
W77-02983

GROUND-WATER RESOURCES OF WILSON COUNTY, NORTH CAROLINA,
Geological Survey, Raleigh, N.C. Water Resources Div.
M. D. Winner, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-258 496, Price codes: A05 in paper copy, A01 in microfiche. Water-Resources Investigations 76-60, June 1976. 85 p, 38 fig, 6 tab, 19 ref.

Descriptors: *Groundwater resources, *Groundwater availability, *Aquifer characteristics, *Water quality, *Water supply, Water yield, Pumping, Drawdown, Groundwater recharge, Groundwater movement, Water level fluctuations, Hydrologic data, Specific capacity, Hydrogeology, Surface-groundwater relationships, Transmissivity, Storage coefficient, Hydraulic conductivity, *North Carolina.
Identifiers: Wilson County(NC).

The most important sources of ground water for Wilson County, North Carolina are (1) the sand beds of the Cretaceous aquifer system in the Coastal Plain section in the eastern part of the county and (2) the bedrock aquifer system in the Piedmont section in the western part of the county. The Cretaceous aquifer is recharged from leakage through overlying beds composed primarily of clay. This leakage rate averages about 67,000 gallons per day per square mile. Present withdrawals from the Cretaceous aquifer average about 740 gallons per day per square mile. Most of the withdrawals from the Cretaceous aquifer are in the Saratoga-Stantonsburg area in eastern Wilson County around which a widespread decline in water level has occurred in the aquifer. Since 1942, the rate of decline has averaged nearly 1.5 feet per year in the center of the pumping area. Availability of water to the bedrock aquifer ranges from about 67,000 gallons per day per square mile in the Coastal Plain section of the county to about 630,000 gallons per day per square mile in the Piedmont section. Present pumpage from the bedrock aquifer in the Piedmont section is estimated to be about 2,300 gallons per square mile. Ground-water quality is generally good in the Cretaceous and bedrock aquifers, except iron concentrations in the water exceed 0.3 milligrams per liter nearly everywhere in the county. (Woodard-USGS)
W77-02984

DIGITAL GROUND-WATER MODEL OF THE OGALLALA AQUIFER IN PARTS OF WASHINGTON AND YUMA COUNTIES, NORTHERN HIGH PLAINS OF COLORADO,
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-02991

MAJOR AQUIFERS IN HAND AND HYDE COUNTIES, SOUTH DAKOTA,
Geological Survey, Huron, S.D. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-02992

2G. Water In Soils

DISTRIBUTIONS AND NATURAL LEVELS OF RELATED METALS IN A TROPHIC PATHWAY,
Allied Chemical Corp., Idaho Falls, Idaho.
For primary bibliographic entry see Field 5B.
W77-02646

EFFECTS OF SOIL CONSERVATION TREATMENT ON RUNOFF AND SEDIMENT LOSS FROM A CATCHMENT IN SOUTHWESTERN NEW SOUTH WALES, AUSTRALIA,
Soil Conservation Service of New South Wales, Sydney (Australia). Wagga Research Station.
For primary bibliographic entry see Field 4D.
W77-02772

STRAIN RATE EFFECT ON THE STRENGTH OF FROZEN SILT,
Cold Regions Research and Engineering Lab., Hanover, N.H.
For primary bibliographic entry see Field 8D.
W77-02804

A METHOD FOR THE DETERMINATION OF MERCURY IN SEDIMENTS BY THE AUTOMATED COLD VAPOR ATOMIC ABSORPTION TECHNIQUE AFTER DIGESTION,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5A.
W77-02811

LANDSCAPE GEOCHEMISTRY AND ENVIRONMENTAL PROBLEMS,
Brock Univ., St. Catharines (Ontario). Dept. of Geological Sciences.
For primary bibliographic entry see Field 5A.
W77-02849

STRUCTURAL COMPOSITION AND SOME PROBLEMS OF THE WATER REGIME OF DARK-CHESTNUT SOILS OF THE KUSTANAI OBLAST IN CONNECTION WITH THE DURATION OF THEIR CULTIVATION, (IN RUSSIAN),
A. A. Naumenko.
Izv Akad Nauk Kaz SSR Ser Biol 13(3), p 45-49, 1975.

Descriptors: *Soil structure, *Soil moisture, *Soil physical properties, *Cultivated lands, Arable land, Evaporation, Moisture availability, Wheat, Soil-water-plant relationships.
Identifiers: Kustanai, Oblast, Kazakh SSR, USSR.

The structural composition of the dark-chestnut soils in the Kustanai Oblast, Kazakh, SSR (USSR), that had been cultivated for different times (virgin soils and plowland sown to spring wheat for 3 and 13 yr) was studied. With long cultivation the macrostructure of the arable horizon breaks down and turns to dust, leading to a deterioration of the moisture supply of wheat due to evaporation from the soil.--Copyright 1976, Biological Abstracts, Inc.
W77-02853

DISTRIBUTION OF WATER AND IONS IN SOILS IRRIGATED AND FERTILIZED FROM A TRICKLE SOURCE,
Agricultural Research Organization, Bet Dagan (Israel). Div. of Soil Chemistry and Plant Nutrition.
For primary bibliographic entry see Field 3F.
W77-02855

CONSUMPTION USE AND WATER REQUIREMENT OF DWARF WHEAT IN LIGHT TEXTURE SOILS OF RAJASTHAN,
S. K. N. Coll. of Agriculture, Jobner (India).
For primary bibliographic entry see Field 3F.
W77-02860

TRICKLE-DRIP IRRIGATION: PRINCIPLE AND APPLICATION TO WATER MANAGEMENT IN TROPICAL SOILS,
Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
For primary bibliographic entry see Field 3F.
W77-02868

EFFECT OF GROUNDWATER MOISTURE O THE FORMATION OF THE SANDY SOILS O THE KET-TYM REGION OF THE OB RIVE (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Soil Geography.
E. D. Nikitin.
Biol Nauki (Mosc) 18(5), p 117-121, 1975.

Descriptors: *Groundwater, *Soil moistu *Sands, *Podzols, *Surface-groundwater relatio ships, Soil profiles, Soil texture, Soil horizo Hydrologic properties, Rock properties.
Identifiers: Ket, Tym, Ob river, USSR.

Data from a study of the sandy podzolic soils the central taiga region of the Ket and Tym tribu ries of the Ob River (USSR) are presented, sho ing that groundwater moisture has a diverse eff on the formation of the podzolic profile of sandy soils depending to a considerable extent the material and texture of the sands. A distin relation was established between the thickness the podzolic horizon of the soils and the depth ground waters and composition of the arenaceo parent rocks. The considerable effect of the co position of the arenaceous parent rocks on the f mation of hydromorphic podzols must be co sidered in the classification and in the econo development of sandy soils.
W77-02885

STUDIES ON SOIL CONSISTENCY: I. CO PREHENSIVE INVESTIGATIONS OF T CONSISTENCY, (IN JAPANESE),
Y. Sato, and Y. Yumura.
Bull Tokaikinki Natl Agric Exp Stn 28, p 1-1975.

Descriptors: *Soils, *Soil tests, *Soil properti *Soil moisture, *Soil physical properti *Cohesive soils, Soil structure, Shrinkage, Sh strength, Soil density, Humus, Plasticity index.
Identifiers: *Soil consistency, Red-Yellow so Clay soils, Red soils.

Soils (27) derived from various parent mater were tested and the properties comprised by term consistency determined. The mutual relati ships among these properties and the relationsh between consistency and other general proper of soils were examined. The soils of su moisture retention capacity tended to have su shrinkage limit, large shrinkage ratio and la volume weight. Cohesion in most red-yellow s was very strong near the moisture level where color changes from dark to light, and weakened further drying. The soils of clay content gener exhibited stronger adhesion, except the soils w high humus content and most red soils. A st was made on a numerical standard for evaluat the magnitude of plasticity. Cohesion, granu cohesion, shear strength, shrinkage ratio plasticity showed highly positive correlati among themselves. The shear strength-moist content curve and cohesion-moisture cont curve were similar in shape. Expression of the content per unit volume markedly increased coefficient of correlation between the clay cont and each property in consistency. The b exchange capacity and the humus content sho

positive correlations with the moisture retention capacity and negative correlations with shrinkage ratio.--Copyright 1976, Biological Abstracts, Inc.
W77-02888

EFFECT OF IRRIGATION ON SOME PROPERTIES OF SOUTHERN CHERNOZEMS, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Soil Science.
B. G. Rozanov, A. P. Dzhindil, and M. A. Abdel'Mottalib.
Biol Nauki (MOSC) 18(5), p 111-116, 1975.

Descriptors: *Irrigation effects, *Chernozems, *Soil groups, *Salt balance, *Soil chemical properties, Salts, Drainage effects, Humus, Nitrogen, Sodium, Chlorine, Calcium, Carbon, Acidic soils.
Identifiers: Humates, USSR, Biochemical regime(Soils), Carbon/nitrogen ratio(Soils), Acid mobility(Soil), Odessa, Rostov.

The change of the salt and biochemical regime of southern chernozems under the effect of irrigation with inadequate drainage in the Odessa and Rostov areas (USSR) was studied. The content of humus and N in the soils during the 1st years of irrigation had a tendency to increase. As a result the C:N ratio narrowed. With inadequate drainage the content of salt in southern chernozems increases. With an increase of the number of years of irrigation there is a trend to a relative increase of the proportion of Na and Cl ions in the salt composition. This may explain the increase of mobility of humic acids in the soil profile, since with an increase of the content of Na ions in solution, mobile sodium humates are more active then the less mobile Ca salts.--Copyright 1976, Biological Abstracts, Inc.
W77-02889

QUALITATIVE COMPOSITION OF IRRIGATION WATER AND SUSPENDED LOAD OF THE ORDZHONIKIDZE IRRIGATION SYSTEM, (IN RUSSIAN),
For primary bibliographic entry see Field 5B.
W77-02890

THE PRODUCTIVENESS OF LOESS SOILS OF DIFFERENT DEGREES OF EROSION, (IN GERMAN),
Giessen Univ. (West Germany).
For primary bibliographic entry see Field 3F.
W77-02891

THE EFFECT OF STAND STRUCTURE ON WATER REGIME OF MOUNTAIN SOILS OF THE CARPATHIANS, (IN RUSSIAN),
All-Union Research Inst. of Soil Erosion Control, Kursk (USSR).
For primary bibliographic entry see Field 4A.
W77-02923

THE AERATION CONDITIONS OF SOUTHERN AND CISCAUCASIAN CHERNOZEMS UNDER IRRIGATION, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of General Soil Sciences.
N. G. Zborishchuk.
Vestn Mosk Univ Ser VI Biol Pochvoved 30(4), p 95-101, 1975.

Descriptors: *Aeration, *Irrigation, *Soil groups, Chernozems, Crops.
Identifiers: Ciscaucasian area(USSR), Eggplant, USSR, *Soil aeration.

The soil aeration of the ciscaucasian chernozems (USSR) deteriorated to a large extent, particularly during the 1st few years of irrigation; that of the southern chernozems remains unchanged. The effectiveness of the aerationpores in a given period of time is denoted by a common index, the 02 C02 ratio, which depends upon the physical conditions of the soil and themicrobiological and biochemical processes taking place in it. An attempt was made to group the soils according to their aeration conditions. (Various crops including eggplant are discussed.) --Copyright 1976, Biological Abstracts, Inc.
W77-02927

DETERMINATION OF THE CRITICAL DEPTH FOR BAGAEVSKO-SADKI IRRIGATION SYSTEM, (IN RUSSIAN),
Moscow State Univ. (USSR). General Soil Sciences.
For primary bibliographic entry see Field 3F.
W77-02928

PHYSICAL AND CHEMICAL PROPERTIES OF TAKYR SOILS AND CHANGES IN THEIR AGROCHEMICAL PROPERTIES AFTER IRRIGATION, (IN RUSSIAN),
For primary bibliographic entry see Field 3F.
W77-02929

ANNUAL DYNAMICS OF SOLUBLE SALTS IN THE SOILS OF AN IRRIGATED FIELD WITH BOTH DEEP CLOSED AND OPEN DRAINAGE AT THE BAGAEVSKO-SADKOVSKAYA IRRIGATION SYSTEM, (IN RUSSIAN),
Moscow State Univ. (USSR). General Soil Sciences.
For primary bibliographic entry see Field 3F.
W77-02930

EXTENSIVE OVERBURDEN POTENTIALS FOR SOIL AND WATER QUALITY,
West Virginia Univ., Morgantown. Div. of Plant Sciences.
For primary bibliographic entry see Field 5B.
W77-03008

A HYDRAULICALLY DRIVEN SOIL AUGER FOR SAMPLING FINE-TEXTURED AND WET SOILS,
South Dakota State Univ., Brookings. Remote Sensing Inst.
B. H. Byrnes.
Soil Science Society of America Proceedings, Vol. 39, No. 1, p 156, January-February 1975. 1 fig, 1 ref.

Descriptors: *Soil tests, Soil investigations, Soils, Equipment.
Identifiers: *Soil sampling, *Soil augers.

A core-type bucket auger was modified to fit the drive bar of a hydraulic soil probe with a rotor head. This auger satisfactorily samples claypan, fine-textured and moderately fine-textured soils in a wet condition. The auger system can readily be used alternately with tube core samplers. (Skogerboe-Colo St)
W77-03063

SOIL WATER EXTRACTION BY ALFALFA,
North Dakota State Univ., Fargo. Dept. of Soils.
For primary bibliographic entry see Field 3C.
W77-03064

A DEVICE FOR ISOLATING FIELD SOIL COLUMNS WITH MINIMUM DISTURBANCE,
Texas A and M Univ., College Station. Dept. of Soil and Crop Sciences.
K. W. Brown.
Soil Science Society of America Proceedings, Vol. 39, No. 6, p 1008-1009, November-December 1975. 2 fig, 2 ref.

Descriptors: *Soil investigations, Lysimeters, *Soil tests, Instrumetation, Measurement, Equipment, Fabrication.
Identifiers: *Soil columns.

A device is described which can be used to dig a ditch to isolate soil blocks in the field. The ditch can be as deep as 1.5 m with a width of 2.5 cm thus minimizing the amount of soil disturbance in individual blocks. The necessary equipment can be fabricated in a well equipped shop with a minimum of expense. (Skogerboe-Colo St)
W77-03065

MINIMAL LEACHING WITH VARYING ROOT DEPTHS OF ALFALFA,
Agricultural Research Service, Riverside, Calif. Salinity Lab.
For primary bibliographic entry see Field 3C.
W77-03066

A COMPACTION APPARATUS FOR THE PREPARATION OF SOIL CORES OF DIFFERENT BULK DENSITIES AND THICKNESSES,
Mississippi State Univ., Mississippi State. Dept. of Agronomy.
V. C. Baligar, V. E. Nash, and F. L. Shuman, Jr.
Soil Science Society of America Proceedings, Vol. 39, No. 5, p 1002-1003, September-October 1975. 2 fig, 1 tab, 7 ref.

Descriptors: *Bulk density, *Moisture tension, Root development, *Soil tests, Soil investigations, Laboratory equipment, Laboratory tests, Instrumentation.
Identifiers: *Soil cores.

An apparatus is described that enables one to prepare soil cores with a desirable bulk density and having different thicknesses for use in soil compaction and plant growth studies. (Skogerboe-Colo St)
W77-03067

A TECHNIQUE FOR INSTALLING INDUCTION COILS IN A PROFILE WITH MINIMUM SOIL DISTURBANCE,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Environmental Effects Lab.
J. W. Spotts, and K. W. Brown.
Soil Science Society of America Proceedings, Vol. 39, No. 5, p 1006-1007, September-October 1975. 4 fig.

Descriptors: *Soil mechanics, *Soil investigations, *Soil tests, Soil properties, Soil engineering.

Details of a technique are given which can be used to position induction coils in an undisturbed soil profile to study the shrinking and swelling within the soil profile with changing moisture content. The specially designed apparatus consists of a soil cutting blade which can be advanced horizontally from an access hole into the soil at the desired depth. The induction coils are installed in the slots after the holes have been cut. Installations have been made successfully at depths as great as 2 m. (Skogerboe-Colo St)
W77-03069

EFFECT OF TEMPERATURE ON DENITRIFICATION RATE IN SOILS,
Instytut Uprawy Nowozenia i Gleboznawstwa, Szczecin (Poland).
G. Stanford, S. Dzienia, and R. A. Vander Pol.
Soil Science Society of America Proceedings, Vol. 39, No. 5, p 867-870, September-October 1975. 3 fig, 1 tab, 12 ref.

Descriptors: *Denitrification, *Temperature, Soils, *Soil investigations, Organic matter, Soil chemistry, Nitrogen, Nutrients.
Identifiers: *Temperature coefficient(Denitrification).

The effect of temperature on denitrification rate was studied with nine soils differing widely in organic matter content and chemical and physical

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characteristics. In the range of 15 to 35C, the temperature coefficient of denitrification, Q10, was approximately 2. Denitrification rates at 35 and 45C were similar. Between 10 and 5C, denitrification rate declined abruptly. The lower limit of the temperature range conforming to a Q10 of 2 was estimated to be 11C. In this study of water-logged soils sealed from the atmosphere, denitrification appeared to obey first-order kinetics. (Skogerboe-Colo St)
W77-03070

EFFECT OF METHOD OF NITROGEN APPLICATION ON CORN (ZEA MAYS L.) GROWN ON IRRIGATED SANDY SOIL,
Nebraska Univ., Concord. Northeast Station.
For primary bibliographic entry see Field 3F.
W77-03071

FERTILIZER OR SALT LEACHING AS AFFECTED BY SURFACE SHAPING AND PLACEMENT OF FERTILIZER AND IRRIGATION WATER,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 3F.
W77-03072

CHANGES IN THE PHYSICAL PROPERTIES OF SOIL CLAYS DUE TO PRECIPITATED ALUMINUM AND IRON HYDROXIDES: I. SWELLING AND AGGREGATE STABILITY AFTER DRYING,
Hawaii Univ., Honolulu. Dept. of Agronomy and Soil Science.
S. A. El-Swaify, and W. W. Emerson.
Soil Science Society of America Proceedings, Vol. 39, No. 6, p 1056-1063, November-December 1975. 5 fig, 4 tab, 25 ref.

Descriptors: Soils, *Soil physical properties, Soil investigations, *Aluminum, *Iron oxides, Soil chemistry, Soil chemical properties, *Clays, Aggregate, Illite, Kaolinite.
Identifiers: Soil swelling, Soil drying.

Compressed discs of an illite, a kaolinite, and a mixture of the two were formed from freeze-dried dispersed suspensions of the clays, into which one level of Fe(OH)3 and two levels of Al(OH)3 had been precipitated. The precipitated Fe was found to consist of particles about 40A in diameter and amorphous to X-ray, rather than the acicular goethite that precipitates under similar conditions in the absence of clay. It was deduced from N2 and water vapor sorption measurements that the precipitated Al was presented as very thin layers on the surface of the clay particles, which in the case of the illite could bridge some of the particles. Their form was generally indeterminate, in contrast to the well-crystallized bayerite formed in the absence of clay. All three hydroxy treatments inhibited the double-layer swelling of the Na-illite and Na-Kaolinite/illite mixture in dilute NaCl solutions. Both on weight percent and on an equimolar basis, Al was more effective than Fe in reducing the slaking of dry clay discs and in increasing the resistance of clay to dispersion in pyrophosphate solutions. (Skogerboe-Colo St)
W77-03073

SUPERSATURATION PHENOMENA AND THE FORMATION OF FLUORAPATITE IN AQUEOUS SUSPENSIONS OF PHOSPHATE ROCK,
Washington Univ., St. Louis, Mo.
S. H. Chien, D. R. Wier, and C. A. Black.
Soil Science Society of America Proceedings, Vol. 39, No. 1, p 43-47, January-February 1975. 1 fig, 4 tab, 14 ref.

Descriptors: *Acids, *Rocks, Rock properties, Soil investigations, *Supersaturation, Soil chemistry.
Identifiers: *Fluorapatite, *Phosphate rocks.

Dilute HCl solutions equilibrated with Florida phosphate rock and Tennessee brown phosphate rock in the presence of solid fluorite developed a condition of supersaturation with respect to fluorapatite at 25C. In suspensions boiled before equilibration at 25C, however, the solutions were in equilibrium with fluorapatite, as evidenced by ion-activity products for fluorapatite in the solutions. (Skogerboe-Colo St)
W77-03074

YIELD RESPONSE OF ALFALFA CULTIVARS AND CLONES TO SEVERAL PH LEVELS IN TATUM SUBSOIL,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Agronomy.
For primary bibliographic entry see Field 3F.
W77-03075

2H. Lakes

SEASONAL VARIATIONS IN CONCENTRATIONS OF NITRATE AND TOTAL PHOSPHORUS, AND CALCULATED NUTRIENT LOADING FOR SIX LAKES IN WESTERN NEW YORK,
State Univ. of New York at Buffalo. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W77-02588

PHYSICAL AND BIOLOGICAL EFFECTS OF THERMAL DISCHARGES AT LA CYGNE LAKE, VOLUME I: PROJECT REPORT,
Kansas Water Resources Research Inst., Manhattan.
For primary bibliographic entry see Field 5C.
W77-02616

PHYSICAL AND BIOLOGICAL EFFECTS OF THERMAL DISCHARGES AT LA CYGNE LAKE, VOLUME II: PROCEDURES AND SELECTED FIELD DATA,
Kansas Water Resources Research Inst., Manhattan.
For primary bibliographic entry see Field 5C.
W77-02617

ECOLOGICAL MODELING AND ESTIMATION OF STRESS,
Rensselaer Polytechnic Inst., Troy, N.Y. Fresh Water Inst.
For primary bibliographic entry see Field 5C.
W77-02622

A STATEMENT OF CONCERNS AND SUGGESTED ECOLOGICAL RESEARCH, REPORT NUMBER 1 OF THE LAKE MICHIGAN COOLING WATER STUDIES PANEL.
Lake Michigan Cooling Water Studies Panel, Chicago, Ill.
For primary bibliographic entry see Field 5C.
W77-02636

AN INVENTORY AND STUDY OF THE LAKE PONTCHARTRAIN-LAKE MAUREPAS ESTUARINE COMPLEX.
Louisiana Wildlife and Fisheries Commission, New Orleans. Div. of Oysters, Water Bottoms and Seafoods.
For primary bibliographic entry see Field 2L.
W77-02671

LAKE ST. CLAIR BEGINNING-OF-MONTH WATER LEVELS AND MONTHLY RATES OF CHANGE OF STORAGE,
National Oceanic and Atmospheric Administration, Ann Arbor, Mich. Great Lakes Environmental Research Lab.
R. N. Kelley.
NOAA Technical Report ERL 372-GLERL 13 May 1976. 16 p, 1 fig, 5 tab, 1 ref. Also as GLERL Contribution No. 74.

Descriptors: *Water levels, *Water level fluctuations, Lakes, Data analysis, Charts, *Michigan.
Identifiers: *Lake St. Clair(Mich)

Lake St. Clair water level gage data are used to determine beginning-of-month water levels and monthly rates of storage change for the years 191 through 1975 for scientific and planning purposes. Analysis of the results indicates that additional gages, strategically located, are needed for improved accuracy. Beginning-of-month values are needed for scientific and planning studies in many fields, such as lake hydrology, beach and shore erosion, navigation, hydroelectric power generation, and lake level regulation. Monthly rates of change of lake storage, which are derived from the beginning-of-month levels, are needed in water budget studies involving net basin supplies, groundwater flows and lake evaporation. (NOAA
W77-02675

AN ANALYSIS OF GREAT LAKES ICE COVER FROM SATELLITE IMAGERY,
National Oceanic and Atmospheric Administration, Ann Arbor, Mich. Great Lakes Environmental Research Lab.
For primary bibliographic entry see Field 2C.
W77-02676

GREAT LAKES ICE COVER, WINTER 1974-75
National Oceanic and Atmospheric Administration, Ann Arbor, Mich. Great Lakes Environmental Research Lab.
For primary bibliographic entry see Field 2C.
W77-02677

THE MUDDY RUN PUMPED STORAGE PROJECT: A CASE HISTORY,
Ichthyological Associates, Inc., Drumore, Pa.
For primary bibliographic entry see Field 5C.
W77-02709

LETHAL AND PREFERRED TEMPERATURE OF THE ALEWIFE (ALOSA PSEUDOHARENGUS) IN LAKE MICHIGAN,
Industrial BIO-TEST Lab., Inc., Northbrook, Ill.
For primary bibliographic entry see Field 5C.
W77-02710

CHANGES IN FISH SPECIES COMPOSITION IN THE AU SABLE RIVER, MICHIGAN FROM THE 1920'S TO 1972,
Institute for Fisheries Research, Ann Arbor, Mich.
For primary bibliographic entry see Field 5C.
W77-02712

THE SMITH MOUNTAIN - LEESVILLE PROJECT: A CASE HISTORY,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W77-02715

THE ECOLOGY OF AN ARTIFICIAL COOLING LAKE,
For primary bibliographic entry see Field 5C.
W77-02723

PLANKTON INVESTIGATIONS NEAR FLEW POWER STATION,
For primary bibliographic entry see Field 5C.
W77-02726

MACROZOOBENTHIC SPECIES ASSEMBLAGES OF SOUTHEASTERN LAKE MICHIGAN, U.S.A.,
S. C. Mozley, and M. H. Winnell.
Verhandlungen Internationale Vereinlgung fur Theoretische und Ungewandte Limnologie, Vol. 19, p. 922-931, October, 1975. 1 tab., 8 fig., 6 ref.

Descriptors: Shallow water, Habitats, *Benthos, *Benthic faunal, *Zooplankton, *Seasonal, *Temperature, Environmental effects, *Variability, *Aquatic populations, *Biological communities, *Sediments, Depth, Aquatic animals, Fluctuations, Animal populations, Aquatic environment, *Lake Michigan.

Benthic macroinvertebrates from a shallow inshore area of Lake Michigan were described in terms of species composition and seasonal or year-to-year variations as part of preoperational investigations near a nuclear power plant. Major changes in zoobenthic species composition, lifespan and abundance, and magnitude of seasonal fluctuations were related to increasing depth. The approximate lower limit of epilimnetic temperatures in summer was at the conceptual boundary of 16 m and was only slightly deeper than the shallowest occurrence of noticeable amounts of silt-sized particles in the sediments. Much of the seasonal and year-to-year variation was due to small Chironomidea and Naididae. Rapid increases in early summer occurred soon after spring warming and phytoplankton blooms. (Katz)
W77-02728

SUCCESSIONS OF THE VEGETATION COVER ON THE DRYING BOTTOM OF LAKE SEVAN, (IN RUSSIAN),
Akademiya Nauk Armyanskoi SSR, Erevan. Institut Geologicheskikh Nauk.
R. O. Geodakyan.
Biol Zh Arm 28(4), p 62-67, 1975.

Descriptors: *Vegetation establishment, *Ecotypes, *Emerging vegetation stage, *Speciation, *Dry beds, Lake stages, Lake beds, Succession.
Identifiers: Armenian-SSR, *Lake Sevan, USSR.

In connection with a drop in the level of Lake Sevan (Armenian SSR(USSR)) about 210 km2 of its bottom has been freed of water. Observations were carried out in 1969, 1970 and 1973 on the southwestern shore, where the width of the dry strip is 1210-1850 m. The purpose was to determine the direction of development of the vegetation cover and rate of its change. The habitat changes of the plants in the dry shore strip are giving rise to a succession from hydro- and hygrophilic species to mesophilic species.--Copyright 1976, Biological Abstracts, Inc.
W77-02736

PLANKTON PHOTOSYNTHESIS AND DEGRADATION IN THE KAPCHAGAI RESERVOIR IN THE THIRD YEAR OF ITS EXISTENCE, (IN RUSSIAN),
Akademiya Nauk Kazakhskoi SSR, Alma-Ata. Inst. of Microbiology and Virology.
For primary bibliographic entry see Field 5C.
W77-02737

LEVELS OF ARSENIC AND SELENIUM IN THE GREAT LAKES REGION,
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 5A.
W77-02751

ASBESTIFORM FIBRE LEVELS IN LAKES SUPERIOR AND HURON,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5B.
W77-02753

THE EFFECT OF AGRICULTURE ON THE SURROUNDINGS OF LAKE BALATON,
University of Agriculture, Keszthely (Hungary).
For primary bibliographic entry see Field 5B.
W77-02776

CIRCULATION, DIFFUSION AND FRONTAL DYNAMICS IN THE COASTAL ZONE,
Woods Hole Oceanographic Institution, Mass.
G. T. Csanady.
Journal of Great Lakes Research, Vol. 1, No. 1, p 18-32, October 1975. 8 fig, 7 ref. NOAA 03-5-022-26.

Descriptors: *Great Lakes, *Lake Ontario, *On-site investigations, *Circulation, Water circulation, Diffusion, Currents(Water), Flow, *Coasts, Jets, Velocity, Distribution patterns, Boundary layers.

A status report on coastal boundary layer research in the Great Lakes is given. The 'first order' or longshore flow is now understood in terms of the conceptual models of coastal jets, Kelvin waves, and topographic waves. Secondary flow perpendicular to shore ('cross-flow' for short) is less well understood, although its understanding is crucial for a parametrization of the mass exchange between coastal zone and midlake. Various contributions to cross-flow were discussed, and their importance in the mass exchange process estimated. (Humphreys-ISWS)
W77-02794

A SIMPLE DISPERSION MODEL OF THE MEAN CONCENTRATION FIELD IN THE WESTERN AND CENTRAL BASINS OF LAKE ERIE,
Canada Centre for Inland Waters, Burlington (Ontario).
P. F. Hamblin.
Journal of Great Lakes Research, Vol 1, No 1, p 92-100, October 1975. 6 fig, 10 ref.

Descriptors: *Great Lakes, *Lake Erie, *Model studies, *Dispersion, Lakes, Mathematical models, Theoretical analysis, Equations, Diffusion, Flow, Circulation, Chlorides, Distribution patterns, Potential flow.
Identifiers: Concentration gradient.

A method of determining horizontal eddy diffusivities appropriate to scales of motion lying at the upper limit of those present in large lakes was based on the comparison of a set of simple solutions of the advection diffusion equation to the mean concentration field of a soluble material. Two features of the annually averaged distribution of the chloride ion in the western and central basins of Lake Erie, namely the sharp gradient of concentration in the vicinity of Pelee Island and the broad plume in the eastern half of the central basin, are best accounted for by a horizontal eddy diffusivity of 3,000,000 sq cm/s. The influence on the dispersal of a dissolved substance by a two-dimensional obstacle placed upstream from a steady source was described and used to account for the concentration gradient occurring between the central and the eastern basins. (Humphreys-ISWS)
W77-02795

OBSERVATIONS OF THE KELVIN-HELMHOLTZ INSTABILITY IN LABORATORY MODELS AND FIELD EXAMPLES OF THERMAL PLUMES,
Old Dominion Univ., Norfolk, Va. School of Engineering.
J. M. Kuhlman, and J. M. Prahl.
Journal of Great Lakes Research, Vol 1, No 1, p 101-115, October 1975. 9 fig, 21 ref.

Descriptors: *Lake Erie, *Lakes, *Laboratory tests, *Jets, *Model studies, Buoyancy, Hydraulic models, Heated water, Stability, Water temperature, Temperature, Velocity, Distribution patterns, On-site tests, Vortices, Aerial photography, Ohio.
Identifiers: *Cuyahoga River(Ohio), *Thermal plumes, Densimetric Froude number.

Buoyant, rectangular thermal plumes were modeled in a 2 by 7 meter laboratory water table facility. The plume entered at right angles to a constant temperature, uniform crossflow of depth equal to that of the plume. Highly buoyant plumes (0.16 less than Fr less than 2) were investigated. Fr is densimetric Froude number. Velocity, temperature, and dye measurements were made using a scanning infrared camera, thermistors, dye injection, and a temperature-compensated hot film anemometer. A Kelvin-Helmholtz instability was observed in the plume thermocline for Fr less than 0.50. For the same values of Fr, a cold water wedge penetrated beneath the plume into the plume discharge channel. A series of transverse line vortices quickly grew in the thermocline to cover the vertical extent of the plume, moving nearly with a mean flow. These vortices were visible both by dye injection into the thermocline and surface infrared imagery. Local gradient Richardson (Ri) numbers fell below 1/4 in the thermocline for all plumes observed (Fr less than 1), but above Fr = 0.50, the Kelvin-Helmholtz instability was dominated by randomized turbulent mixing. This vortex instability was also observed in aerial infrared photographs taken by NASA of the Cuyahoga River mouth entering Lake Erie. Field measurements indicated that Ri is less than 1/4 in the thermocline at the river mouth. (Humphreys-ISWS)
W77-02796

RECONSTRUCTION OF SOME OF THE EARLY STORM SURGES ON THE GREAT LAKES,
Department of the Environment, Ottawa (Ontario). Ocean and Aquatic Affairs.
T. S. Murty, and R. J. Polavarapu.
Journal of Great Lakes Research, Vol 1, No 1, p 116-129, October 1975. 10 fig, 3 tab, 20 ref, 1 append.

Descriptors: *Great Lakes, *Surges, *Water level fluctuations, *Lake Erie, Water levels, On-site data collections, Analytical techniques, Storms, Weather patterns, Meteorological data.

Some early (pre-World War II) storm surges on the Great Lakes which produced storms that were extensive enough to influence the whole Great Lakes system were reconstructed making use of scant meteorological and oceanographic data and descriptions from popular literature. Port Colborne, on the northeastern shore of Lake Erie, exhibited consistently great storm surges. Negative surges were observed in narrow connecting waters such as the Detroit River. The simple analytical techniques used showed that the water level changes could be accounted for mostly by the large-scale pressure system. An appendix briefly described some of the analytical formulae that were used. It should be made clear that the choice of the parameters for these analytical formulae is rather uncertain, and the accuracy of the estimate is + or - 0.5 feet. Hence, the reconstruction was not attempted for surges with amplitudes less than one foot. (Humphreys-ISWS)
W77-02797

NITROGEN IN SEDIMENTED ORGANIC MATTER FROM LAKE ONTARIO,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5C.
W77-02815

U. S. DEPT. OF AGRICULTURE
URBANA-CHAMPAIGN

EVALUATION OF THE PHYTOPLANKTON BIOMASS IN LAKES OF THE WORLD, (IN RUSSIAN),
Belorussian State Univ., Minsk (USSR).
T. M. Mikheeva.
Gidrobiol Zh 11(3), p 90-104, 1975.

Descriptors: *Phytoplankton, *Biomass, *Lakes.
Identifiers: Belorussian-SSR, *USSR.

Data are presented on the calculated phytoplankton biomass in about 300 lakes of the world, of which 2/3 are located in the USSR (40% of these in the Belorussian SSR). In a number of cases of errors in the method used are revealed. The phytoplankton in a negligibly small part of the world's lakes have been covered by quantitative investigations.--Copyright 1976, Biological Abstracts, Inc.
W77-02816

LAKE WHITEFISH (CORREGONUS CLUPEAFORMIS (MITCHILL) IN SOUTHERN INDIAN LAKE, MANITOBA,
Fisheries and Marine Service, Winnepeg (Manitoba).
H. A. Ayles.
Canada Fisheries and Marine Service Technical Report No. 640, 1976. 34 p. 3 fig., 9 tab., 41 ref

Descriptors: *Baseline studies, *Fish populations, *Canada, Commercial fishing, Food habits, Growth stages, Fish reproduction, Spawning, Mortality, Size, Age, Fish eggs.
Identifiers: *Southern Indian Lake(Manitoba), *Whitefish, Coregonus clupeaformis.

The spawning and population characteristics of lake Whitefish, from Southern Indian Lake, Manitoba, were investigated as part of an effort to establish baseline data prior to the completion of a major hydroelectric development in the region. Whitefish spawn in October or November over areas of large boulders or broken rocks in depths of 1 to 7 meters. Low temperature appeared to trigger the spawning act. The average spawning age for both males and females was 8.8 years, with an average egg count of 28,600. Growth and condition were good for lake whitefish in most regions of the lake, though whitefish from South Bay did not appear to grow as quickly. Different year class strengths were suggested by variation in mean age, weight, and length between whitefish sampled in 1974 versus those sampled in 1972. Principal food items were amphipods, sphaeriids, gastropods and chironomid larvae. Mortality rates varied from 0.43 to 0.70. The flow of the Churchill River through Southern Indian Lake has a strong positive influence on its productivity, resulting in a significant commercial whitefish fishery. Commercial fishing of whitefish has yielded an average of 400,000 kilograms per year since 1942. (Luedtke-Wisconsin)
W77-02821

TEMPORAL VARIATIONS IN THE PHOSPHORUS CONTENT OF A NORTHERN DYSTROPHIC LAKE,
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
For primary bibliographic entry see Field 5C.
W77-02824

TROPHIC CLASSIFICATION OF LAKES USING LANDSAT-1 (ERTS-1) MULTISPECTRAL SCANNER DATA,
Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5A.
W77-02825

CORROSION OF SELECTED MATERIALS IN LAKE MEAD WATER,
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 8G.
W77-02832

AN INVENTORY AND STUDY OF THE LAKE PONTCHARTRAIN-LAKE MAUREPAS ESTUARINE COMPLEX,
Louisiana Wildlife and Fisheries Commission, New Orleans, Div of Oysters, Water Bottoms and Seafoods.
For primary bibliographic entry see Field 5C.
W77-02879

STUDY OF PERIPHYTON PRODUCTIVITY IN THE NOVOSIBIRSK RESERVOIR, (IN RUSSIAN),
Akademiya Nauk SSSR, Novosibirsk. Central Siberian Botanical Garden.
For primary bibliographic entry see Field 5C.
W77-02915

CHARACTERISTICS OF THE DISTRIBUTION OF MOLLUSKS OF THE FAMILY UNIONIDAE IN THE KREMENCHUG RESERVOIR, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instutut Zoologii.
V. V. Ivantsiv.
Vestn Zool 6, p 82-84, 1975.

Descriptors: *Mollusks, *Distribution, Reservoirs, Benthos, Biomass.
Identifiers: Anodonta-cygnea, Anodonta-minima, Anodonta-piscinalis, Anodonta-ponderosa, Anodonta-subcircularis, Anodonta-zellensis, Pseudanodonta-complanata, Pseudanodonta-elongata, Ukrainian-Ssr, Unio-longirostris, Unio-ovalis, Unio-pictorum, Unio-tumidus, *Unionidae, USSR, *Kremenchug Reservoir(USSR).

In the macrobenthos of the Kremenchug Reservoir (Ukrainian SSR, USSR), 12 unionid species were found: Anodonta piscinalis, A. subcircularis, A. cygnea, A. ponderosa, A. minima, A. zellensis, Pseudanodonta elongata, P. complanata, Unio tumidus, U. pictorum, U. ovalis and U. longirostris. The distribution of the unionids in this reservoir was essentially dependent on hydrological and hydrochemical conditions. The numbers, biomass and species variety of unionids were greatest in the upper part of the reservoir, and lowest in the lower part, where studies were conducted primarily in a deepwater arm.--Copyright 1976, Biological Abstracts, Inc.
W77-02921

STRATIGRAPHY AND HISTORY OF DEVELOPMENT OF THE VOITOVTSOVSK BOG IN THE VINNITSA OBLAST, (IN UKRAINIAN),
Akademiya Nauk URSR, Kiev. Instytut Botaniki.
A. I. Kuz'mychov, and T. L. Andriyenko.
Ukr Bot Zh 32(6), p 774-778, 1975.

Descriptors: *Stratigraphy, *Bogs, History, Peat.
Identifiers: Balneology, Ukrainian-Ssr, USSR, Voitovtsovsk Bog, *Vinnitsa Oblast(USSR).

A thorough description is presented of an unique bog in the Ukraine (Ukrainian SSR, USSR). The plant cover of the Voitovtsovskoe bog, its geomorphology, peat species and the structure of the peat accumulation are considered. The history of the bog's development is traced from its stratigraphy. The significance of the bog for balneological purposes due to the chemical composition of the peat is discussed.--Copyright 1976, Biological Abstracts, Inc.
W77-02922

EFFECTS OF FLOOD FLOWS ON WATER QUALITY OF TIOGA-HAMMOND LAKES; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 5B.
W77-02931

BIOLOGICALLY ACTIVE SUBSTANCES O THE SILT DEPOSITS OF DNIEPER RESE VOIRS, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instyt Hidrobiologii.
For primary bibliographic entry see Field 5B.
W77-02934

FALLS LAKE WATER-QUALITY STUD HYDRAULIC LABORATORY INVESTIG TION,
Army Engineer Waterways Experiment Stati Vicksburg, Miss.
For primary bibliographic entry see Field 5B.
W77-02941

A VARIATIONAL APPROACH TO NONLINE WAVE THEORY,
Army Engineer Waterways Experiment Stati Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02942

ESTIMATION OF WINDS OVER THE GRE LAKES,
Army Engineer Waterways Experiment Stati Vicksburg, Miss.
D. T. Resio, and C. L. Vincent.
Available from the National Technical Inform tion Service, Springfield, Va. 22161 as AD/A-0 022, Price codes: A04 in paper copy, A01 microfiche. Miscellaneous Paper H-76-12, J 1976. 71 p, 29 fig, 3 tab, 37 ref, append.

Descriptors: *Wind velocity, *Great Lakes, E mating, Lakes.

Past efforts to estimate wind speeds over a la lake have met with very limited success. The p pose of this study is to demonstrate that, wit combined theoretical-empirical approach, wi over a lake can be obtained from transform wind speeds at nearby land stations. The theor cal results provide a basis for comparison of m empirical data sets and establish a rational me of analyzing the expected differences betw winds over land and those over a marine surfa This in turn affords a means of examining sy matic variations in the ratio of wind speeds ov lake to wind speeds over land. The good ag ment theory and observation indicates that w estimates over the lake can be made for a w range of synoptic conditions with an rms erro under 5 knots. The theoretical curve for the l wind/land ratio provides a stable estimate of l winds well beyond wind speeds for which ther good empirical data. Consequently, the techni presented here offers relatively good relativ good accuracy even in extreme wind conditi where there are little or no direct measurement winds over the lake. (WES)
W77-02944

TIOGA OUTLET WORKS, TIOGA AND HA MOND LAKES, SUSQUEHANNA RIVER BAS PENNSYLVANIA; HYDRAULIC MODEL VESTIGATION,
Army Engineer Waterways Experiment Stat Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02956

STRATIFIED FLOW IN GREAT SALT LA CULVERT,
Geological Survey, Salt Lake City, Utah. W Resources Div.
For primary bibliographic entry see Field 8B.
W77-02987

LAKE ERIE INTERNATIONAL JETPO MODEL FEASIBILITY INVESTIGATION; PLICATION OF THREE-DIMENSION

HYDRODYNAMIC MODEL TO STUDY EFFECTS OF PROPOSED JETPORT ISLAND ON THERMOCLINE STRUCTURE IN LAKE ERIE,
Case Western Reserve Univ., Cleveland, Ohio. Dept. of Earth Sciences.
J. F. Paul, and W. J. Lick.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-022 588, Price codes: A05 in paper copy, A01 in microfiche. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi, Contract Report H-75-1, March 1976 (Report 17-6, Report 6 of a series). 82 p, 52 fig, 25 ref.

Descriptors: *Airports, *Hydraulic models, *Lake Erie, *Numerical analysis, *Thermocline, Feasibility studies, Model studies, *Ohio.
Identifiers: Cleveland area(Ohio).

A previously developed three-dimensional, variable-density hydrodynamic model was applied to the Lake Erie area about Cleveland. This application was to investigate the effect of a proposed jetport island on the summer stratification pattern in the nearshore lake area and on the flushing characteristics of the Cuyahoga River outflow into the lake. Initial results obtained from the application of the model are presented. (WES)
W77-02994

THE DISTRIBUTION AND ABUNDANCE OF LARVAL FISHES ALONG THE WESTERN SHORE OF LAKE ERIE AT MONROE, MICHIGAN,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
D. D. Nelson, and R. A. Cole.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-251 207, Price codes: A04 in paper copy, A01 in microfiche. Institute of Water Research, Michigan State University, Technical Report No. MSU-IWR-TR-75-0032.4, October 1975. 66 p, 2 tab, 9 fig, 37 ref.

Descriptors: *Fish, *Freshwater fish, *Thermal powerplant, *Michigan, *Lake Erie, *Cooling waters, *Heated water, Coldwater fish, Fry, *Electric power, Water pollution sources, Yellow perch, Carp, White bass.
Identifiers: Larval fish, Western Lake Erie, Monroe(Mich), Gizzard shad, *Alewife, Freshwater drum.

The distribution and abundance of larval fish in and around the condenser cooling-water system of an electric generating station on western Lake Erie was studied during the summers of 1973 and 1974. Samples were collected with a 1m, number 0 mesh (0.571 mm) plankton net. Analysis of variance and Tukey's post-hoc comparisons were used to analyze differences in numbers of individuals collected. During the study period, 20 species of taxonomic groups were identified although 90% of the total catch was represented by only 4 taxa. Abundances from year to year within these most abundant groups varied greatly, indicating a need for more than short-term studies. (Katz)
W77-03011

TEMPERATURE TOLERANCE OF YOUNG-OF-THE-YEAR LAKE WHITEFISH, COREGONUS CLUPEAFORMIS,
National Marine Fisheries Service, Ann Arbor, Mich. Great Lakes Fishery Lab.
For primary bibliographic entry see Field 5C.
W77-03024

MOVEMENT OF YELLOW PERCH (PERCA FLAVESCENS) AND WHITE SUCKER (CATOSTOMUS COMMERSONI) IN A NEARSHORE GREAT LAKES HABITAT SUBJECT TO A THERMAL DISCHARGE,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5C.
W77-03027

A LAKEWIDE STUDY OF PHYTOPLANKTON BIOMASS AND ITS SPECIES COMPOSITION IN LAKE ERIE, APRIL-DECEMBER 1970,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5C.
W77-03039

THE EFFECT OF THE DISCHARGE OF THERMAL EFFLUENT FROM A POWER STATION ON THE PRIMARY PRODUCTIVITY OF AN EPIPHYTIC ALGAL COMMUNITY,
Alberta Univ., Edmonton. Dept. of Botany.
For primary bibliographic entry see Field 5C.
W77-03046

DISTRIBUTION OF FISH SPECIES IN GREAT BEAR LAKE, NORTHWEST TERRITORIES, WITH REFERENCE TO ZOOPLANKTON, BENTHIC INVERTEBRATES, AND ENVIRONMENTAL CONDITIONS,
Fisheries and Marine Service, Winnipeg (Manitoba). Freshwater Inst.
For primary bibliographic entry see Field 5C.
W77-03055

RECOVERY OF POLLUTED LAKES; A SWEDISH RESEARCH PROGRAM ON THE EFFECTS OF ADVANCED WASTEWATER TREATMENT AND SEWAGE DIVERSION: 7. DIFFUSE MUNICIPAL POLLUTION: EXAMPLES FROM THE TOWNS OF MOTALA AND UPPSALA, (IN SWEDISH),
Uppsala Kommun Naturvardsverkets RR-Undersokning (Sweden). Algtestlab. Fysiol. Bot.
For primary bibliographic entry see Field 5D.
W77-03057

2I. Water In Plants

INFLUENCE OF SAND IN REDDS ON SURVIVAL AND EMERGENCE OF BROOK TROUT (SALVELINUS FONTINALIS),
Wisconsin Cooperative Fishery Unit, Stevens Point.
D. A. Hausle, and D. W. Coble.
Transactions of American Fisheries Society, Vol. 105, No. 1, p. 57-63, 1976, 3 fig., 4 tab., 26 ref.

Descriptors: *Brook trout, *Reproduction, *Fish eggs, *Hatching, *Immature growth stage, *Fry, *Sands, *Spawning, Environmental effects, *Artificial substrates, Trout, Fish reproduction, Laboratory tests, Life cycles, Dissolved oxygen, Methodology, Mortality, Fish management.
Identifiers: Survival, *Artificial redds.

Alevins of brook trout (Salvelinus fontinalis) were buried in laboratory troughs in spawning gravel containing 0 to 25% sand. Sand slowed emergence and reduced the number of fry emerging. Weight of fry was not related to proportion of sand in the gravel, but was related to time; the fry were heaviest near the time of peak emergence, and lighter before and after the peak. Survival was estimated to be 84% from egg deposition to hatching for brook trout in Lawrence Creek, Wisconsin, and 70% from hatching to emergence, providing a total estimate for survival from egg deposition to emergence of 59%. (Katz)
W77-02711

A SEQUENTIAL APPROACH TO THE COUNTING OF PLANKTON ORGANISMS,
Pavia Univ. (Italy).
For primary bibliographic entry see Field 7B.
W77-02721

COMPARATIVE MORPHOLOGICAL AND ECOPHYSIOLOGICAL ASPECTS OF TWO SCLEROPHYLLOUS CHILEAN SHRUBS,
Universidad Catolica de Chile, Santiago. Laboratorio de Botanica; and Universidad Catolica de Chile, Santiago. Inst. of Biological Sciences.
For primary bibliographic entry see Field 3B.
W77-02858

ANOMALOUS WATER RELATIONS IN COPPER-DEFICIENT WHEAT PLANTS,
Waite Agricultural Research Inst., Glen Osmond (Australia). Dept. of Agronomy.
R. D. Graham.
Australian Journal of Plant Physiology, Vol. 3, No. 2, p 229-236, March, 1976. 2 fig, 3 tab, 17 ref.

Descriptors: *Wheat, *Leaves, *Wilting, *Wilting point, *Water loss, *Moisture availability, Resistance, Copper, Moisture deficit, Water utilization, Water yield, Root systems, Root development, Soil water, Soil moisture, Soil-water-plant relationships, Stomata, Moisture, Moisture content, Drying.
Identifiers: *Copper deficiency(Plants), *Leaf water potential, *Diffusive resistance(Plants).

Wilting is perhaps the most widely observed symptom of copper deficiency in cereals. Experiments were conducted to investigate the way in which copper deficiency affected the water relations of wheat plants, and to test the hypothesis that the low root-shoot ratio of copper deficient plants resulted in low plant water potentials, and thus wilting. Leaf water potential, diffusive resistance, relative water content, weekly water use, yields and head bending were measured on wheat plants subjected to four copper levels and two water levels, and the results presented. Severe copper deficiency resulted in no grain yield, wilting, and increased leaf diffusive resistance. Water supply effects were observed but there was no interaction between copper and water treatments. Mild copper deficiency resulted in small yield decreases. It is concluded that wilting, characteristic of copper-deficient plants, is due to structural weakness and not to the water stress of the plants; also, increased leaf diffusive resistance is due to a specific effect of copper deficiency on guard cells and not to decreased leaf water potential. (Jamail-Arizona)
W77-02861

A COMPARATIVE STUDY OF THE EFFECT OF SOIL MOISTURE ON THE GROWTH AND TRANSPIRATION OF CERTAIN POPLAR FORMS, (IN BULGARIAN),
Forest Research Inst., Sofia (Bulgaria).
T. Naydenova-Yaneva.
Gorsko Stop Nauka. 11(5), p 42-52, 1974.

Descriptors: *Soil moisture, *Transpiration, *Plant growth, *Trees, Soil types, Forest soils, Brown soils, Alluvium.
Identifiers: Poplars, Populus euramericana, Populus weltheimeipappel.

Glasshouse experiments were carried out with 4 poplar forms: Populus euramericana I-214, P. euramericana I-262, P. euramericana I-455 and P. weltheimeipappel on 2 soil types: alluvial and brown forest (dark) at a permanent soil moisture content of 100, 85, 70, 55, 40 and 25% of its maximum water-holding capacity. The amount of water transpired by a single sapling during the experiment, as well as that per gram of increment, was higher if the soil moisture ranged 70-100% of the maximum water-holding capacity, and the least at 40-25%. The optimal moisture content or the moisture content at which the highest increment of a vegetative mass was obtained for the poplar forms varied at 70-85%. If soil moisture was increased or decreased, the increment decreased, being the least at moisture content of 40 and 25%. P. euramericana I-214 and P. weltheimeipappel showed almost similar growth on alluvial soils,

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having a moisture content of 100 and 85%; the best growth was that of P. euramericana I-214 at a moisture content ranged 40-55%. On brown forest soils P. euramericana I-262 showed good growth at a range of soil moisture of 40-100%, but at a soil moisture of 25% it had the lowest growth as compared with the other poplar forms.--Copyright 1975, Biological Abstracts, Inc.
W77-02886

THE ECOLOGY OF CADDIS FLIES (TRICHOPTERA) FROM MOUNTAIN STREAMS OF SOUTHERN TIEN-SHAN (EXEMPLIFIED BY THE FAUNA OF THE AK-BURA RIVER), (IN RUSSIAN),
Oshskii Gosudarstvennyi Pedagogicheskii Institut (USSR).
E. O. Omorov.
Entomol Obozr 54(4), p 773-779, 1975.

Descriptors: *Caddis flies, Aquatic insects, Invertebrates, Larvae, *Ecology, Benthic fauna, Rivers, Streams.
Identifiers: Ak-Bura, Apatania-copiosa, Arctopsyche-sp, Dinarthrum-reductum, Himalopsyche-gigantea, Himalopsyche-hoplura, Hydropsyche-gracilis, Hydropsyche-sp, Rhyacophilia-obscura, Rhyacophila-praebranchiata, Tadzhik-Ssr, Tien-Shan, USSR.

Caddis fly larvae and pupae were collected in the Ak-Bura river (the Altai ridge) (Tadzhik SSR, USSR); the list of species is given. The greatest specific variety was observed in the middle and upper current zones. According to the specific composition of caddisflies the zones can be grouped as follows: an upper current zone is characterized by the abundance of Himalopsyche gigantea, H. hoplura larva and Rhyacophila praebranchiata larvae; a middle current zone is characterized by the prevalence of R. obscura, Arctopsyche sp., Dinarthrum reductum, Aptania copiosa, etc.; in the lower current zone the most abundant are Hydropsyche gracilis and Hydropsyche sp.--Copyright 1976, Biological Abstracts, Inc.
W77-02892

AMINO ACID AND FRACTIONAL COMPOSITION OF PROTEIN OF THE VEGETATIVE MASS OF CORN AT DIFFERENT LEVELS OF MINERAL NUTRITION AND WATER SUPPLY, (IN RUSSIAN),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Kormov, Moscow (USSR).
F. V. Voronkova, V. S. Titov, E. S. Vorob'ev, and B. B. Okonskii.
S-Kh Biol 10(6), p 841-848, 1975.

Descriptors: *Amino acids, *Proteins, *Corn(Field), *Nutrients, Water supply, Mineralogy, *Nitrogen.
Identifiers: Albumin, Globulin, Glutelin, Prolamin, Silage.

Sowing dates, water availability and mineral nutrition affect the biological value of crude protein in corn. With acute water deficit the redistribution of N-containing substances between corn stems and leaves affected the utilization of amino acids and the digestibility of nutrients of the silage. In newly-cut corn from unirrigated plots the amount of albumin in stems approached their content in leaves; there were more globulins, proalamins and glutelins in stems than in leaves. The quantitative amino acid composition of protein fractions in corn in irrigated plots was different from that of non-irrigated plots.--Copyright 1976, Biological Abstracts, Inc.
W77-02918

CARBOHYDRATES AND NITROGENEOUS COMPOUNDS IN A NUMBER OF HIGHER AQUATIC PLANTS AND DYNAMICS OF THEIR CONTENT DURING VEGETATION, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
K. B. Yakubovskii, and A. I. Merekhko.
Gidrobiol Zh 11(6), p 81-84, 1975.

Descriptors: *Carbohydrates, *Nitrogen compounds, Aquatic plants, Vegetation, *Proteins, Amino acids.
Identifiers: Alisma-plantago, Butomus-umbellatus, Phragmites-communis, Polygonum-amphibium, Potamogeton-perfoliatus, Scirpus-lacustris, Typha-angustifolia.

Data are presented on the content of nitrogeneous substances (crude protein), carbohydrates and free amino acids in narrowleaf cattail (Typha angustifolia), common reed (Phragmites communis), flowering-rush (Butomus umbellatus), water plantain (Alisma plantago), bulrush (Scirpus lacustris), perfoliate pondweed (Potamogeton perfoliatus) and willow-grass (Polygonum amphibium). The content of carbohydrates and nitrogenous compounds in the plants was variable during vegetation in the individual species. In early Aug. the qualiative and quantiative composition of free amino acids depended on the plant species. In general the content of amino acids was high. Harvesting of these aquatic plants should be done before their flowering, since they have high fodder value at this period.--Copyright 1976, Biological Abstracts, Inc.
W77-02919

THE DEVELOPMENT OF SCIENTIFIC BASES AND A TECHNOLOGY OF PRODUCTION IN POND FISH BREEDING, (IN RUSSIAN),
Moskovskaya Selskokhozyaistvennaya Akademiya (USSR).
F. G. Martyshev, Yu. A. Privezentsev, V. V. Lavrovskii, I. M. Anisimova, and Yu. V. Kudryashova.
Isv Timiryazev S-Kh Akad 1, p 138-144, 1976.

Descriptors: Carp, Fisheries, Ponds, Fish hatcheries, Reservoirs, Technology, Trout, Cisco.
Identifiers: Breeding, Coregonus-peled, Crucian carp, Goldfish, Salmo-irideus.

The investigations of the department and laboratory of pond fish culture for the last 5 yr took 2 main directions: improving stock growing technology and increasing the specific composition of pond fish (Salmo irideus, Coregonus peled, carp, Crucian carp, goldfish) in reservoirs.--Copyright 1976, Biological Abstracts, Inc.
W77-02924

EFFECT OF MUSKRATS ON AQUATIC VEGETATION, (IN RUSSIAN),
V. A. Chashchukhin.
Byull Mosk O-Va Ispyt Prir Otd Biol 80(6), p 21-29, 1975.

Descriptors: *Muskrats, *Vegetation, *Europe.
Identifiers: Eurasia, Reed, *USSR.

The introduction of muskrats into Eurasian bodies of water disturbed the existing biocenotic relationships in many localities. The removal of reeds and other plant species, a reduction of aquatic macrophyte thickets and the resulting decrease in muskrat abundance were observed in several regions of the USSR and in some countries of W Europe.--Copyright 1976, Biological Abstracts, Inc.
W77-02925

METABOLISM OF PROTEIN AND NUCLEIC ACIDS DURING ADAPTATION TO VARIOUS TYPES OF DROUGHT, (IN RUSSIAN),
Vsesoyuznyi Institut Rastenievodstva, Leningrad (USSR).
For primary bibliographic entry see Field 3F.
W77-02926

BIOTRANSFORMATION AND CHEMICAL FORM OF MERCURY IN PLANTS,
Environmental Montoring and Support Lab , Las Vegas, Nev.
For primary bibliographic entry see Field 5C.
W77-03006

THE GROWTH AND YIELD OF POPLAR CULTURES UNDER WATERING AND FERTILIZATION CONDITIONS, (IN BULGARIAN),
Research Station of Rapid-Growth Tree Species, Svistov (Bulgaria)
For primary bibliographic entry see Field 3F.
W77-03040

CALCULATION OF RATE OF NUTRIENT UPTAKE BY GROWING ROOTS,
National Fertilizer Development Center, Muscle Shoals, Ala.
F. F. Khasawneh
Agronomy Journal, Vol. 67, No. 4, p 574-576, July-August 1975. 21 equ, 7 ref.

Descriptors: *Root development, *Root systems, *Nutrients, *Nutrient removal, *Fertilizers, Mathematical analysis, Crop response.
Identifiers: *Root aging, *Root growth.

Equations are presently available to calculate the rate of nutrient uptake by growing roots. They can be used to estimate an average rate of uptake by the entire root system, but they fail to give specific information on uptake by a unit segment of root or on the effects of aging and morphological changes of such a segment on its capacity for uptake. A theoretical analysis is presented of the process of nutrient uptake by a growing root system. The objective of this analysis is to derive equations that would give such specific information. A frequency distribution function is used to partition root systems into a continuum of age groups, each possessing a rate of uptake that is a function of the age of that group. Equations are derived that utilize time-series measurements of root length and nutrient accumulation in the plant. These derivations are used to calculate parameters of nutrient uptake related to two properties of the root system: (1) the rate of nutrient uptake of a unit segment of root and the manner by which this rate changes with aging and (2) the rate of nutrient flux into the entire root system as a function of time. (Skogerboe-Colo St)
W77-03061

2J. Erosion and Sedimentation

SEBASTIAN INLET. GLOSSARY OF INLETS REPORT NO. 3,
Florida Univ., Gainesville. Coastal and Oceanographic Engineering Lab.
For primary bibliographic entry see Field 2L.
W77-02673

DELAWARE'S CHANGING SHORELINE,
Delaware Univ., Newark. Dept. of Geology.
For primary bibliographic entry see Field 2L.
W77-02684

EFFECTS OF MAN ON THE INTERFACE OF THE HYDROLOGICAL CYCLE WITH THE PHYSICAL ENVIRONMENT.
For primary bibliographic entry see Field 4D.
W77-02771

THE EROSION INDEX AS A FACTOR FOR DETERMINING TURBIDITY IN RIVERS (L'INDICE D'EROSION-FACTEUR DE DETERMINATION DE LA TURBIDITE DES RIVIERES),
R. Papasov.

In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No 113, p 15-20, 1974. 3 fig, 1 tab, 6 ref.

Descriptors: *Turbidity, *Rivers, *Sediment discharge, *Foreign countries, *Streams, Soil classification, Cultivation, Graphical methods, Watersheds(Basins), Rainfall intensity, Erosion, Slopes, Soil physical properties, Vegetation effects, Agriculture, Soil types.
Identifiers: *Stream turbidity, *Bulgaria, Erosion index.

In determining the average annual sediment discharge P kg/s, the average annual stream turbidity rho g/cu m, and the sediment modulus q sub p g/s/sq km, in rivers, the erosion index epsilon kg/s and the soil characteristic X were used. These two factors quantitatively describe the erosion process in catchments and the influence of different soils upon them. The erosion index was defined mainly by the characteristics of the catchment, the rainfall intensity (mm/min), the slope gradient i, vegetation, and the degree to which soil is plowed p. The rainfall intensity plays an important role in determining the erosion index. Different soil types and cultivation also affect the erosion index. The influence on the erosion process of human activity by soil cultivation and exploitation of pasture and woodland is evident and was also considered in the investigation. Empirical formulae were obtained, and nomographs were devised for simple and rapid evaluation of the erosion index, sediment discharge, and turbidity in rivers. (See also W77-02771) (Froehlich-ISWS)
W77-02773

PLANT COVER AND SEDIMENT TRANSPORTATION IN THE RIVER BASIN OF THE SEINE (LA COUVERTURE VEGETALE ET LES DEBITS SOLIDES DES COURS D'EAU DANS LE BASSIN DE LA SEINE),
J. Tixeront.
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No. 113, p 28-35, 1974. 1 fig, 4 tab, 12 ref.

Descriptors: *Sediment discharge, *Rivers, *Foreign countries, *Vegetation effects, Watersheds(Basins), Suspended load, Sediment transport, Sediment yield, Forests, Cropland, Arable land, On-site data collections.
Identifiers: *France, *Paris, *Marne River, *Seine River.

The basin of the Seine has been the site of a remarkable evolution of plant cover since the mid-nineteenth century: (1) the forested area or area covered by herbaceous vegetation has increased, and (2) the area of arable land has decreased by about 40%. As the volume of suspended material in the rivers originates essentially from arable land, it could be expected that there would be a decrease in the quantity of suspended material. One can compare the sedimentation measurements performed during the years 1864, 65, and 66 on the Seine and the Marne upstream from Paris with the values observed today. Such a comparison seems to give a significant correlation with the decrease of arable land. The future developments that are likely to happen as a result of current trends are: (1) a cessation of the expansion of forested areas; (2) the return to cultivation of areas in Champagne, France, that had been forested between 1850 and 1950; and (3) the increase in size of the cultivated areas as a result of new trends in land distribution. (See also W77-02771) (Humphreys-ISWS)
W77-02775

EROSION PHENOMENA IN DRAINAGE BASINS REFLECTED BY SEDIMENT FLOW IN RIVERS (PHENOMENES D'EROSION DES BASSINS VERSANTS REFLETES PAR LES TRANSPORTS SOLIDES DES COURS D'EAU),
Institutul de Meteorologie si Hidrologie, Bucharest (Rumania).
C. Diaconu.
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No 113, p 57-61, 1974. 3 fig, 1 tab, 10 ref.

Descriptors: *Watersheds(Basins), *Sediment yield, *Erosion, *Rivers, Foreign countries, Sediment discharge, Vegetation effects, Sediment load, Sediment distribution, Sediment transport, Sheet erosion, Soil erosion.
Identifiers: *Romania.

The long-term mean values of the sediment discharges, their territorial distribution, the laws of their variation with altitudes, as well as the characteristics of sediment discharges conditioned by the water flow were defined as the main characteristic elements of the sediment flow in rivers which themselves show the state of erosion in a basin. The connection existing between these characteristic elements and the state of erosion in basins was analyzed, emphasizing the great degree of complexity in the reflection of the erosion phenomena in a basin on the sediment movement in rivers through the transition state when the river beds act as temporary deposition sites for sediment in movement from the erosion site on the upland to the ocean. A method of determining the possible maximum values of the specific mean sediment flow on the basis of the state of erosion in basins was given. The growing need for research on methodological aspects of this topic was mentioned. (See also W77-02771) (Humphreys-ISWS)
W77-02780

THE EFFECT OF AFFORESTATION ON EROSION PROCESSES AND SEDIMENT YIELD,
Institute of Hydrology, Wallingford (England).
For primary bibliographic entry see Field 4C.
W77-02781

APPROACHES TO CONTROLLING EROSION IN RURAL AREAS,
Strathclyde Univ., Glasgow (Scotland). Dept. of Civil Engineering.
For primary bibliographic entry see Field 4D.
W77-02782

WATER EROSION AND SEDIMENT DISCHARGE,
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
A. V. Karaushev, I. V. Bogaliubova, and N. N. Bobrovitskaya.
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No 113, p 73-77, 1974. 1 fig, 1 tab, 8 ref.

Descriptors: *Erosion, *Watersheds(Basins), *Rural areas, *On-site investigations, *Europe, On-site data collections, Sediment discharge, Land use, Soil erosion, Runoff, Soils, Podzols, Sediment load, Sediment yield.
Identifiers: *USSR.

The principles of research into water erosion were considered; interrelationships between the processes of erosion from the slopes of drainage basins and sediment discharge from river basins were given, both on the basis of general theoretical principles as well as with regard to topography, man's activities, etc. A simplified theoretic model of surface wash from slopes was proposed; the model takes into account the extent and type of the overland flow. Design rules were given, based on morphometric parameters of the stream network. A method for approximately quantifying slope erosion produced by spring snow melting or single storms was given. Data on soil wash resulting from spring snowmelt floods are generalized according to observations made at water balance stations and small watersheds (125 station years) in the areas of accelerated (anthropomorphic) water erosion in the central part of the European territory of the USSR. Graphs and tables were given which characterize the quantity of soil wash from different soil types and different agricultural practices as a function of runoff depth during spring snowmelt floods. (See also W77-02771) (Humphreys-ISWS)
W77-02783

PREDICTING SEDIMENT YIELD FREQUENCY FOR RURAL BASINS TO DETERMINE MAN'S EFFECT ON LONG-TERM SEDIMENTATION,
Agricultural Research Service, Temple, Tex.
For primary bibliographic entry see Field 4D.
W77-02786

SOIL COVER GOVERNS SOIL LOSS ON UNITED STATES CLAYPAN SOILS,
Agricultural Research Service, Columbia, Mo. North Central Region Watershed Research Center.
For primary bibliographic entry see Field 4D.
W77-02787

SUSPENDED SEDIMENTS FROM URBAN DEVELOPMENT,
Ottawa Univ. (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 4C.
W77-02788

URBANIZATION AND THE PROCESSES OF EROSION AND SEDIMENTATION IN THE RIVER NILE,
Ain Shams Univ., Cairo (Egypt). Dept. of Engineering.
For primary bibliographic entry see Field 4C.
W77-02789

INCREASE OF SEDIMENT TRANSPORT DUE TO LARGE-SCALE URBANIZATION,
National Research Centre for Disaster Prevention, Tokyo (Japan).
For primary bibliographic entry see Field 4C.
W77-02790

EFFECT OF THE GROWTH OF THE WEST PART OF MEXICO CITY ON HYDRODYNAMIC PROCESSES (EFFET DE LA CROISSANCE DE LA PARTIE OUEST DE LA VILLE DE MEXICO SUR LES PROCESSUS HYDRODYNAMIQUES),
Universidad Nacional Autonoma de Mexico, Mexico City. Instituto de Geografia.
For primary bibliographic entry see Field 4C.
W77-02791

SUSPENDED SEDIMENT PRODUCTION AND BUILDING ACTIVITY IN A SMALL BRITISH BASIN,
Exeter Univ. (England). Dept. of Geography.
For primary bibliographic entry see Field 4C.
W77-02792

EFFECT OF LAND DEVELOPMENT ON SOIL EROSION AND SEDIMENT CONCENTRATION IN AN URBANIZING BASIN,
Parsons, Brinckerhoff, Quade and Douglas, Inc., New York.
For primary bibliographic entry see Field 4C.

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W77-02793

A METHOD FOR THE DETERMINATION OF MERCURY IN SEDIMENTS BY THE AUTOMATED COLD VAPOR ATOMIC ABSORPTION TECHNIQUE AFTER DIGESTION,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5A.
W77-02811

A NOTE ON EFFICACY OF VEGETATIVE COVERS AND SLOPES ON RUNOFF AND FERTILITY LOSSES IN A SEMI-ARID TRACT OF RAJASTHAN,
S. K. N. Coll. of Agriculture, Jobner (India).
For primary bibliographic entry see Field 4D.
W77-02856

FINITE-STATE MODELS OF TRANSPORT PHENOMENA IN HYDROLOGIC SYSTEMS,
Arizona Univ., Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 2F.
W77-02865

STUDY AND EVALUATION OF REMEDIAL SAND BYPASSING PROCEDURES,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 2L.
W77-02933

BIOLOGICALLY ACTIVE SUBSTANCES OF THE SILT DEPOSITS OF DNIEPER RESERVOIRS, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytyt Hidrobiologii.
For primary bibliographic entry see Field 5B.
W77-02934

USE OF AUTOMATED REMOTE SENSING TECHNIQUES TO DEFINE THE MOVEMENT OF TOW-GENERATED SUSPENDED MATERIAL PLUMES ON THE ILLINOIS AND UPPER MISSISSIPPI RIVERS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
L. E. Link, Jr, and A. N. Williamson, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-025 733, Price codes: A04 in paper copy, A01 in microfiche. Technical Report M-76-6, June 1976. 56 p, 7 fig, 6 tab, 13 plates, 9 ref, append.

Descriptors: *Aerial photography, *Illinois River, *Infrared radiation, *Mississippi River, *Optical properties, *Plumes, *Remote sensing, *Suspended load, *Sedimentation, *Water sampling.

Sequential color-infrared aerial photos and corresponding surface water samples were obtained at selected sites on the Illinois and Upper Mississippi Rivers to examine the movement of tow-generated suspended material plumes. The aerial photos were digitized with a scanning microdensitometer, and optical density values were extracted for correlation with suspended material concentration data obtained by laboratory analysis of the water samples. The poor correlation between optical density and concentration values prevented quantitative definition from the imagery of the distribution of suspended material concentrations at the sites as a function of time. Digital data handling procedures were used to enhance the visibility on the imagery of the tow-generated plumes. The procedures applied were successful in delineating the movement and dissipation of the tow-generated plumes under favorable sun and water conditions. (WES)
W77-02957

BEACH NOURISHMENT TECHNIQUES; REPORT 1, DREDGING SYSTEMS FOR BEACH NOURISHMENT FROM OFFSHORE SOURCES,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
T. W. Richardson.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-024 983, Price codes: A20 in paper copy, A01 in microfiche. Technical Report H-76-13, September 1976 (Report 1 of a series). 83 p, 46 fig, 1 tab, 1 plate, 86 ref.

Descriptors: *Beaches, *Shores, *Dredging.
Identifiers: *Dredged material, *Beach nourishment.

Results are presented of the first two phases of a research project aimed at developing new dredging systems for beach nourishment from offshore sources. As an introduction to the subject matter, the current situation in the United States regarding beach nourishment and offshore dredging equipment is outlined. Example nourishment projects are described in order to illustrate the types of nourishment projects accomplished and the range of equipment used to date. Next, the engineering considertions involved in selecting an optimum nourishment system for a particular project or project category are presented, and their effects on system characteristics are discussed. The main body of the report presents the results of an investigation into equipment suitable for offshore nourishment work. Approximately 50 examples are described illustrating dredge types, pipelines, connections, and miscellaneous pieces of equipment. The final portion of the report consists of the selection of certain equipment subcategories for further consideration and the construction of possible offshore nourishment systems using this selected quipment. (WES)
W77-02965

RESISTANCE EQUATION FOR ALLUVIAL-CHANNEL FLOW,
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 8B.
W77-02971

FLUME STUDIES WITH FINE AND COARSE SANDS,
Geological Survey, Lakewood, Colo. Water Resources Div.
C. F. Nordin, Jr.
Open-file report 76-762, September, 1976. 18 p, 5 fig, 3 tab, 11 ref.

Descriptors: *Model studies, *Sediment transport, *Hydraulic properties, *Flumes, Laboratory tests, *Sands, Particle size, Flow rates, Methodology.

This report presents a summary of hydraulic and sediment-transport data for two series of laboratory studies in a recirculating flume. Sands with median diameters of 0.25 and 1.1 millimeters were used in the studies. Velocities and depths were controlled, and the slopes, bed configurations and sediment-transport rates adjusted to the imposed independent variables. Mean depths were varied from about 0.2 to 0.9 meter and mean velocities ranged from about 0.4 to 2.0 meters per second. (Woodard-USGS)
W77-02976

2K. Chemical Processes

PESTICIDE RESIDUE ANALYSIS IN WATER (103.1), TRAINING MANUAL,
Environmental Protection Agency, Cincinnati, Ohio. Office of Water Program Operations.
For primary bibliographic entry see Field 5A.
W77-02624

ACID PRECIPITATION,
Cornell Univ., Ithaca, N.Y. Section of Ecology and Systematics.
For primary bibliographic entry see Field 2B.
W77-02800

APPLICATIONS OF DIRECT AQUEOUS INJECTION GAS CHROMATOGRAPHY AND FREEZE CONCENTRATION FOR THE DETERMINATION OF ORGANIC COMPOUNDS IN WATER AND WASTE WATERS,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5A.
W77-02809

NEW AUTOMATED COLORIMETRIC METHOD FOR THE DETERMINATION OF CHLORIDE USING CHROMOTROPIC ACID,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5A.
W77-02812

HETEROGENEOUS SENSITIZED DECOMPOSITION OF WATER WITH SUNLIGHT,
Exxon Research and Engineering Co., Linden N.J.
A. K. Ghosh, and H. P. Maruska.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-246 172, Price codes: A02 in paper copy, A01 in microfiche. Report No. SNF-RA-N-75-090, September 1975. 22 p. 9 fig., 13 ref. NSF ERP75-13901.

Descriptors: *Hydrates, *Water chemistry, Oxygen, Hydrogen, Light, Electrochemistry, Thin films, Electrolysis, Hydrogen bonding.
Identifiers: *Water decomposition, *Photocatalyst, Copper oxide, Titanium dioxide, Sunlight, Sputtering.

The objective of the project is to demonstrate that an inexpensive heterogeneous photocatalyst may efficiently decompose water to hydrogen and oxygen with sunlight, specifically focusing on sensitization of known photo catalysts to the sunlight spectrum. In the first quarter of the project, a short circuit photocurrent response in the visible with chromium-doped titanium dioxide in an electrochemical cell has been demonstrated. It was also shown that titanium dioxide could be grown electrochemically in an inexpensive manner. Copper oxide was grown by oxidation of copper and sputtering of copper oxide to make a copper oxide/titanium dioxide heterojunction is being investigated. (Luedtke-Wisconsin)
W77-02819

RECORDS OF WELLS AND WATER QUALITY FOR THE GARBER-WELLINGTON AQUIFER NORTHERN OKLAHOMA AND SOUTHERN LOGAN COUNTIES, OKLAHOMA,
Geological Survey, Oklahoma City, Okla. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-02974

A WATER-QUALITY ASSESSMENT OF THE BURNHAM CREEK WATERSHED, POLK COUNTY, MINNESOTA,
Geological Survey, St. Paul, Minn. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-02979

GROUND-WATER RESOURCES OF WILSON COUNTY, NORTH CAROLINA,
Geological Survey, Raleigh, N.C. Water Resources Div.
For primary bibliographic entry see Field 2F.
W77-02984

VATER-RESOURCES DATA FOR DEEP QUIFERS ON EASTERN MONTANA,
Geological Survey, Helena, Mont. Water esources Div.
or primary bibliographic entry see Field 7C.
W77-02985

MAJOR AQUIFERS IN HAND AND HYDE OUNTIES, SOUTH DAKOTA,
Geological Survey, Huron, S.D. Water Resources iv.
or primary bibliographic entry see Field 4B.
W77-02992

ONTENT OF LITHIUM, URANIUM AND HORIUM IN MINERAL SPRINGS OF THE AKHICHEVAN ASSR, (IN RUSSIAN),
or primary bibliographic entry see Field 5A.
W77-03016

FFECT OF TEMPERATURE ON DENITRIFI-ATION RATE IN SOILS,
nstytut Uprawy Nowozenia i Gleboznawstwa, zczecin (Poland).
or primary bibliographic entry see Field 2G.
W77-03070

HANGES IN THE PHYSICAL PROPERTIES F SOIL CLAYS DUE TO PRECIPITATED LUMINUM AND IRON HYDROXIDES: I. WELLING AND AGGREGATE STABILITY FTER DRYING,
Hawaii Univ., Honolulu. Dept. of Agronomy and oil Science.
or primary bibliographic entry see Field 2G.
W77-03073

UPERSATURATION PHENOMENA AND THE ORMATION OF FLUORAPATITE IN AQUE-OUS SUSPENSIONS OF PHOSPHATE ROCK,
Washington Univ., St. Louis, Mo.
or primary bibliographic entry see Field 2G.
W77-03074

2L. Estuaries

OREGONS'S ESTUARIES,
Oregon State Univ., Corvallis. Water Resources esearch Inst.
.. L. Percy, C. Sutterlin, D. A. Bella, and P. C. Clingeman.
vailable from the National Technical Informa-on Service, Springfield, VA 22161 as PB-254 067, rice codes: A12 in paper copy, A01 in microfiche. regon's Estuaries, May 1974.

escriptors: *Estuaries, *Bays, Inlets(Waterways), *Intertidal areas, Oceans, ivers, Straits, Streams.
lentifiers: *Oregon, *Oregon estuaries, *Oregon ays, *Hydraulic descriptions Sea Grant Program.

his report provides a summary of much of the own information about Oregon's estuaries. It ves numerous agencies where supporting infor-ation can be obtained. This report provides the anner with a 'starting point' for assembling the quired data concerning most of the Oregon tuaries. (Author extracted)
W77-02593

FFECTS OF CRUDE OIL ON MARINE INVER-EBRATES,
exas Univ. Medical Branch at Galveston. Marine omedical Inst.
or primary bibliographic entry see Field 5C.
W77-02627

TRACE HYDROCARBON ANALYSIS: THE NATIONAL BUREAU OF STANDARDS, PRINCE WILLIAM SOUND/NORTHEASTERN GULF OF ALASKA, BASELINE STUDY,
National Bureau of Standards, Washington, D. C. Analytical Chemistry Div.
For primary bibliographic entry see Field 5A.
W77-02628

THE MARINE BIOLOGICAL IMPACT OF THE HONOLULU GENERATING STATION,
Hawaii Univ., Honolulu. Sea Grant Program.
For primary bibliographic entry see Field 5C.
W77-02631

ADSORPTION OF COPPER AND COBALT FROM FRESH AND MARINE SYSTEMS,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
For primary bibliographic entry see Field 5B.
W77-02645

PROCEEDINGS OF THE TWENTY-EIGHTH ANNUAL GULF AND CARIBBEAN FISHERIES INSTITUTE.
Rosenstiel School of Marine and Atmospheric Science, Miami, Fla.
For primary bibliographic entry see Field 5C.
W77-02660

STORM TIDE FREQUENCY ANALYSIS FOR THE OPEN COAST OF VIRGINIA, MARYLAND, AND DELAWARE,
National Weather Service, Silver Spring, Md. Office of Hydrology.
F. P. Ho, R. J. Tracey, and V. A. Meyers.
NOAA Technical Memorandum NWS HYDRO-32, August 1976. 57 p, 23 fig, 7 tab, 42 ref.

Descriptors: *Hurricanes, *Floods, *Hazards, *Coasts, *Storm water, *Virginia, *Maryland, *Delaware, Climatology, Tides, Sea level, Insurance, Storm surge, Frequency analysis.
Identifiers: Storm tides.

Storm tide height frequency distributions are developed on the coast of Virginia, Maryland and Delaware for the National Flood Insurance Program. Storm tides are computed from a full set of climatologically representative hurricanes using the National Weather Service numerical-dynamic storm surge model. Winter storm effects are estimated from tide gage records. Storm tide levels from all storms are shown in coastal profile between annual frequencies of 0.10 and .002. This report is intended for use in estimating actuarial risk to buildings from coastal floods and in flood plain management. (NOAA)
W77-02661

MARINE POLYCULTURE BASED ON NATURAL FOOD CHAINS AND RECYCLED WASTES,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 5C.
W77-02662

THE ARCTIC COASTAL ENVIRONMENT OF ALASKA. VOL. II: A COMPILATION AND REVIEW OF SCIENTIFIC LITERATURE OF THE ARCTIC MARINE ENVIRONMENT,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 5C.
W77-02665

HYDRODYNAMIC MODEL OF THE GREAT BAY ESTUARINE SYSTEM,
New Hampshire Univ., Durham. Mechanics Research Lab.
B. Celikkol, and R. Reichard.
Sea Grant Program Report No. UNH-SG-153, August 1976. 115 p, 9 fig, 1 tab, 21 ref, 12 append. SG-04-5-158-50 (SGR/CZ-2).

Descriptors: *Estuaries, *Hydrodynamics, *Mathematical models, *New Hampshire, Coasts, Estuarine environment, Model studies.
Identifiers: Bottom friction, Eddy viscosity, *Great Bay estuary(NH).

A numerical hydrodynamic model developed by Connor and Wang has been applied to the Great Bay Estuary system. The model, using the finite element method, was found to be better suited to the complexities of the Great Bay Estuary system than Leendertse's finite difference model. Initial model development has been completed, and qualitatively acceptable results are presented. A numerical experiment was conducted to develop a procedure to be used for selction of critical model parameters in the calibration process. The general scheme for model calibration is presented, and is ready to be implemented, pending receipt of current data collected last summer by the National Ocean Survey. (NOAA)
W77-02667

HISTORY OF OCEAN DUMPING IN THE GULF OF MEXICO,
Texas A and M Univ., College Station. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5E.
W77-02668

THE INTERACTION OF WAVES AND OIL SPILL,
Massachusetts Inst. of Tech., Cambridge. Dept. of Ocean Engineering.
For primary bibliographic entry see Field 5B.
W77-02669

FORMULAS USED TO ANALYZE WIND-DRIVEN CURRENTS AS FIRST-ORDER AUTOREGRESSIVE PROCESSES,
National Oceanic and Atmospheric Administration, Seattle, Wash. Pacific Marine Environmental Lab.
H. O. Mofield, and D. Mayer.
NOAA Technical Memorandum ERL PMEL-7, August 1976. 24 p, 6 fig, 6 tab, 2 ref.

Descriptors: *Ocean currents, Numerical analysis, *Alaska, *Regression analysis.
Identifiers: Outer Continental Shelf, *Wind driven currents, *Autoregression analysis.

This memorandum justifies formulas used to analyze wind-driven ocean currents as first-order autoregressive processes forced by the wind. A set of numerical experiments with synthetic data shows that the formulas give accurate results with both white and nonwhite noise forcing and with either filtered or non-filtered data. The formulas are a significant improvement over those traditionally used in autoregression analysis based on covariances. (NOAA)
W77-02670

AN INVENTORY AND STUDY OF THE LAKE PONTCHARTRAIN-LAKE MAUREPAS ESTUARINE COMPLEX.
Louisiana Wildlife and Fisheries Commission, New Orleans. Div. of Oysters, Water Bottoms and Seafoods.
Technical Bulletin No. 19, January 1976. 165 p, 3 maps. PL 88-309, Proj 2-188-R.

Descriptors: *Estuarine environment, Aquatic life, *Baseline studies, Water resources, *Louisiana, *Gulf of Mexico, Lakes, Invertebrates, Zooplankton, Mollusks, Hydrology, Climatology, Sediments.
Identifiers: *Coastal zone, *Lake Pontchartrain(La), *Lake Maurepas(La), Vertebrates.

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This study was made to investigate the composition, general distribution, and abundance of commercially or potentially important fauna inhabiting the Lake Pontchartrain-Lake Maurepas estuarine complex, so that comparisons with previously completed wetland research in Louisiana and the northern Gulf of Mexico might enable administrators to efficiently manage Louisiana's renewable coastal zone resources. Vertebrate and macroinvertebrate populations were sampled with a 16-foot trawl and a 100-foot beach seine. Mulluscan benthic communities were empirically determined utilizing a Peterson dredge. Zooplankton was estimated based upon collections accomplished utilizing a no. 2 mesh 1.8x0.5 meter net. Hydrological and climatological parameters were collected at four stations in addition to those coinciding with trawl, seine, Peterson, and zooplankton locations. Grain size determinations were made of the upper three inches of sediment samples during two separate sampling efforts--one in 1972 and another in 1973. (NOAA)
W77-02671

ECONOMICS OF STORM PROTECTION,
Delaware Univ., Newark. Coll. of Marine Studies.
For primary bibliographic entry see Field 6F.
W77-02672

SEBASTIAN INLET. GLOSSARY OF INLETS REPORT NO. 3,
Florida Univ., Gainesville. Coastal and Oceanographic Engineering Lab.
A. J. Mehta, W. D. Adams, and C. P. Jones.
Sea Grant Program Report No. 14, August 1976. 55 p, 5 fig, 7 tab, 37 ref. SG-04-3-158-43.

Descriptors: *Florida, *Inlets(Waterways), *Sedimentation, *Sediment transport, Geology, Storms, Dredging, Jetties.
Identifiers: Sebastian Inlet(FL), Morphology.

This report of Sebastian Inlet is one of a 'Glossary of Inlets' series to be prepared under the State University System Sea Grant project, 'Nearshore Circulation, Littoral Drift and the Sand Budget of Florida'. The purpose of this series is to provide for each inlet a summary of the more significant available information and to list known documentation. Sebastian Inlet is a man-made cut connecting the Atlantic Ocean to the Indian River on the east coast of Florida, about 45 miles south of Cape Canaveral. Following a brief note on the geologic setting information is given on its climate and storm history, jetty improvements, dredging, its morphological changes, hydraulics and the sedimentary processes. (NOAA)
W77-02673

A SHEARED COORDINATE SYSTEM FOR STORM SURGE EQUATIONS OF MOTION WITH A MILDLY CURVED COAST,
National Weather Service, Silver Spring, Md. Techniques Development Lab.
For primary bibliographic entry see Field 2B.
W77-02674

ABSTRACTS. SPECIAL SYNPOSIUM - THE MIDDLE ATLANTIC CONTINENTAL SHELF AND NEW YORK BIGHT,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
For primary bibliographic entry see Field 5C.
W77-02678

THE METULA OIL SPILL,
National Oceanic and Atmospheric Administration, Boulder, Colo. Marine Ecosystems Analysis Program Office.
For primary bibliographic entry see Field 5C.
W77-02679

BISCAYNE BAY AND ITS ENVIRONS. AN ANALYSIS OF ITS PRESENT AND FUTURE USES FOR METROPOLITAN DADE COUNTY,
General Oceanics, Inc., Miami, Fla.
For primary bibliographic entry see Field 5G.
W77-02680

SEDIMENT DISPERSAL PATTERNS AS CLUES TO PLACER-LIKE PLATINUM ACCUMULATION IN AND NEAR CHAGVAN BAY, ALASKA,
Wisconsin Univ., Madison. Marine Research Lab.
For primary bibliographic entry see Field 5B.
W77-02681

EFFECTS OF BALED SOLID WASTE DISPOSAL IN THE MARINE ENVIRONMENT--A DESCRIPTIVE MODEL,
New Hampshire Univ., Durham. Dept. of Earth Sciences.
For primary bibliographic entry see Field 5B.
W77-02683

DELAWARE'S CHANGING SHORELINE,
Delaware Univ., Newark. Dept. of Geology.
J. C. Kraft, E. A. Allen, D. F. Belknap, C. J. John, and E. M. Maurmeyer.
Delaware Coastal Zone Management Program, Technical Report No. 1, May 1976. 330 p, 177 fig, 2 append.

Descriptors: *Delaware, *Coasts, *Geology, *Sediment transport, *Shore protection, *Subsidence, *Sea level, Beaches, Geomorphology
Identifiers: *Coastal zone, *Shoreline changes, Shorelines, Eustacy.

The coastal zone of Delaware, including both the coasts of Delaware Bay and the Atlantic shoreline, is categorized as a lagoon-barrier-marsh shoreline. This coastal zone is presently undergoing a relatively rapid transgression by the Atlantic Ocean. This transgression is an effect of coastal erosion caused by the action of waves and high tidal waters. However, in addition longer term geologic factors such as coastal subsidence and sinking of the continental margin apply. Another aspect is that of eustatic, or actual, rise in the level of the world's oceans. A combination of these factors leads to a pervasive erosion and gradual rise of the Atlantic Ocean relative to Delaware's land area. The report details some of the geological processes and summarizes present knowledge of the geology of the area, its sedimentary environments, rates of change and active processes, and presents some predictions of expected change. Consideration of these factors by planners, coastal managers and coastal residents will lead to much less friction in the future regarding unwarranted expenditures of public funds in a manner effective only over the short term, five or ten year period.(NOAA)
W77-02684

COASTAL ZONE BOUNDARIES.
Delaware State Planning Office, Dover. Coastal Zone Management Program - Public Involvement. Working Paper No. 2, September 1976. 35 p. 13 fig, 1 tab.

Descriptors: *Delaware, *Management, *Coasts, *Wetland, *Salt marshes, Boundaries(Surfaces), Maps, Tidal marshes, Beaches, *Coastal marshes.
Identifiers: *Coastal zone management, *Uplands, Coastal waters, Territorial sea.

This is the second in a series of working papers which will be issued to interested citizens and governmental officials so that they may actively and effectively participate in the development of Delaware's Coastal Zone Management Program. Regulations implementing the Federal Coastal Zone Management Act specify that the management program show evidence that the State i developed and applied a procedure for identify the boundary of the coastal zone. Necessary ments of this identification process are include this working paper. The final Coastal Z Management Program for Delaware will ref both regulatory applications due to the coa relationship of the entire State. Therefore, the tire State is recommended for inclusion in management program. This area will be the b for broad program management purposes, prim ly coordination, information systems, and b standards development. This boundary refle many of the biophysical concerns, especially drainage basin/watersheds factors, as well as m ing use of the established intitutional structure fered by a coastal counties approach. (NOAA)
W77-02685

ASSATOAGUE MARINE SANCTUARY: A CA STUDY,
Virginia Inst. of Marine Science Gloucester Poi
For primary bibliographic entry see Field 6G.
W77-02686

GEOGRAPHIC AREAS OF PARTICULAR CO CERN.
Delaware State Planning Office, Dover. Coa Zone Management Program - Public Involveme Working Paper No 3, September 1976. 20 p.

Descriptors: *Delaware, *Geographical regio *Land use, *Groundwater, *Coasts, Habit Hazards.
Identifiers: Coastal zone management, Coa processes, Coastal waters, Subaqueous lands.

This is the third in a series of working pap which will be issued to interested citizens governmental officials so that they may activ and effectively participate in the development Delaware's Coastal Zone Management Program deals only with the process of determining ar and describes the significance of those areas c sidered and the initial planning steps taken wh will load to eventual designation of Geograp Areas of Particular Concern. Subjects treated clude: Areas of unique, scarce, fragile or vulne ble natural habitat or feature, historic archaeological significance, or scenic value; ar of high productivity or essential habitat for liv resources, or of critical concern for the product of food, areas of substantial urban use, recreat or economic value, opportunity or concentrati areas subject to significant hazards due to coa processes, groundwater resources areas; areas geologic, topographic or morphologic concern development; and coastal waters and subaque lands. (NOAA)
W77-02687

COASTAL ZONE BOUNDARIES. SUMMARY
Delaware State Planning Office, Dover. Coa Zone Management Program - Public Involveme Working Paper No 2 (Summary), September 19 3 p.

Descriptors: *Delaware, *Management, *Coa Wetlands, Salt marshes
Identifiers: *Coastal zone management, Uplan Territorial sea, Coastal waters.

This paper summarizes the second in a series working papers issued to interested citizens governmental officials so that they may activ participate in the development of Delawar Coastal Zone Management Program. The sumr ry provides details on the procedure for identi ing the seaward and inland boundaries Delaware's Coastal Zone. Federal lands identified and recommended management boun ries and the impact of the boundary recommen tions are discussed. (NOAA)
W77-02688

ROBABILISTIC TRAJECTORY ASSESS-IENTS FOR OFFSHORE OIL SPILLS IMPACT-NG LONG ISLAND,
lassachusetts Inst. of Tech., Cambridge.
or primary bibliographic entry see Field 5B.
/77-02689

IARYLAND UPLANDS NATURAL AREAS TUDY. VOL I: EASTERN SHORE,
ogers and Golden, Inc., Philadelphia, Pa.
Rogers, S. Syz, and F. Golden.
eport to Maryland Department of Natural esources Coastal Zone Management Program, 976). 104 p, 18 fig, 5 tab, append.

escriptors: *Land use, *Natural resources, Water table, *Coasts, *Maryland, *Wetlands, ssessments, Wildlife, Recreation, Forestry, isheries, Runoff, Soils, Vegetation.
lentifiers: *Coastal zone management, *Aquatic uffer zones, *Uplands, Environmental assess-ents, Coastal aquatic environments.

he Maryland Uplands Natural Areas Study olume I describes the scope, objectives and ethodologies of the natural areas inventory of laryland's coastal zone. The data parameters sed in the inventory as well as the potential users nd the uses of the data are discussed. A special ffort was made to describe in detail the processes nd considerations relating to aquatic buffer ones. It is through the hydrologic processes that pland natural areas are most directly related to oastal aquatic environments. The discussion of uffer zones in this volume provides detail neces-ary to understand the natural processes in these ones and to allow delineation of aquatic buffer ones. Included is a discussion of the rationale be-ind the choice of parameters inventoried and the echniques used in the natural areas inventory. A iscussion of how areas might be evaluated for pecified uses or relative quality is also part of this olume. (See also W77-02691) (NOAA)
/77-02690

IARYLAND UPLANDS NATURAL AREAS TUDY. VOL II: EASTERN SHORE FIELD OTEBOOK,
ogers and Golden, Inc., Philadelphia, Pa.
Rogers, S. Syz, and F. Golden.
eport to Maryland Department of Natural esources Coastal Zone Management Program, larch 1976. 238 p, 15 fig.

escriptors: *Maryland, *Coasts, *Wetlands, Land use, Geology, Physiography, Vegetation, ata processing, Management, Resources, As-essments, *Natural resources.
lentifiers: *Aquatic buffer zone, *Coastal Zone anagement, *Uplands, *Resources assessment.

he report is organized into three sections. First, e study area is described in terms of its geology, hysiography, and vegetation communities. epresentative cross sections of the different egetation communities are included. This is fol-wed by a brief overview of the site selection rocess, the data management system and the arameters and potential uses that were sampled. he remaining portion of the report covers the tailed encoding instruction for filling out the eld data forms. These instructions are organized data card as shown on the sample field data rm. The Field Notebook incorporated in this olume represents the methodology developed by e Coastal Zone Management Program for sam-ing upland natural areas on Maryland's Eastern ore. The notebook contains a description of the tural history of the shore as well as a description the methods and techniques for data collection. is intended to serve as a manual for organiza-ns or individuals who may be interested in car-ing out field surveys of upland sites on the East-n Shore. (See also W77-02690) (NOAA)
77-02691

CONCENTRATIONS AND CONCENTRATION FACTORS OF HEAVY METALS IN BROWN ALGAE,
University Coll. of North Wales, Menai Bridge. Marine Science Labs.
For primary bibliographic entry see Field 5A.
W77-02698

TOXICITY OF THE SURGEON FISHES-II PROPERTIES OF THE PRINCIPAL WATER SOLUBLE TOXIN,
Tohoku Univ., Sendai (Japan). Faculty of Agriculture.
For primary bibliographic entry see Field 5C.
W77-02700

PERSISTENCE OF POLYCHLORINATED BIPHENYLS IN THE HARD-CLAM (MERCENARIA MERCENARIA) AND THE EFFECT UPON THE DISTRIBUTION OF THESE POLLUTANTS IN THE ESTUARINE ENVIRONMENT,
London Univ. (England). Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W77-02703

LEAD UPTAKE IN TWO MARINE PHYTOPLANKTON ORGANISMS,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 5C.
W77-02708

COMPARISON OF 115M CD ACCUMULATION FROM SEDIMENTS AND SEA WATERS BY POLYCHAETE WORMS,
National Inst. of Radiological Sciences, Nakaminato (Japan). Marine Radio-Ecological Research Station.
For primary bibliographic entry see Field 5B.
W77-02717

EDWARDSIELLA TARDA FROM AN EPIZOOTIC OF MULLETS (MUGIL CEPHALUS) IN OKITSU BAY, (IN JAPANESE),
Kochi Univ. (Japan). Dept. of Cultural Fisheries.
For primary bibliographic entry see Field 5C.
W77-02718

STUDIES ON THE CHEMICAL BEHAVIOR OF 106-RU IN SEA WATER AND ITS UPTAKE BY MARINE ORGANISMS -I, ACCUMULATION AND EXCRETION OF 106-RU BY CLAM,
National Inst. of Radiological Sciences, Nakaminato (Japan). Marine Radio-Ecological Research Station.
For primary bibliographic entry see Field 5C.
W77-02722

BIOACCUMULATION OF MERCURY IN MYOXOCEPHALUS QUADRICORNIS (L.) (TELEOSTEI, COTTIDAE) IN AN UNPOLLUTED AREA OF THE BALTIC,
Helsinki Univ. (Finland). Dept. of Environmental Science.
For primary bibliographic entry see Field 5C.
W77-02731

EFFECTS OF WATER QUALITY ON LARVAL SETTLEMENTS IN LOS ANGELES HARBOR AS DETERMINED BY MULTIVARIATE STATISTICAL TECHNIQUES,
University of Southern California, Los Angeles. Allan Hancock Foundation.
For primary bibliographic entry see Field 5C.
W77-02735

CONTAMINANTS IN THE NEW YORK BIGHT,
Manhattan Coll., Bronx, N.Y. Environmental Engineering and Science Program.
For primary bibliographic entry see Field 5B.
W77-02799

WAVE PROPAGATION DURING THE GHANA UPWELLING,
Ghana Univ., Legon. Dept. of Physics.
R. W. Houghton, and T. Beer.
Journal of Geophysical Research, Vol. 81, No. 24, p 4423-4429, August 20, 1976. 9 fig, 1 tab, 9 ref.

Descriptors: *Ocean waves, *Upwelling, *Atlantic Ocean, *Africa, Waves(Water), Internal waves, On-site investigations, Continental shelf, Temperature, Water temperature, Salinity, Foreign countries, Currents(Water), Ocean currents, Correlation analysis, Coasts, Oceanography.
Identifiers: *Kelvin waves, *Ghana.

During the coastal upwelling in 1974, the ocean temperature along the coast of Ghana exhibited periodic variations at a frequency of 0.07 cpd which propagated westward along the coast. Equatorial, shelf, and Kelvin waves were discussed in this paper, and it was stated that the 1974 wave could be described in terms of any of these types of waves. However, it was concluded that in the light of current theories of energy exchange in coastal waves, the 1974 oscillation most likely was an internal Kelvin wave. (Sims-ISWS)
W77-02801

SPATIAL AND TEMPORAL VARIATIONS IN THE INTERSTITIAL WATER CHEMISTRY OF CHESAPEAKE BAY SEDIMENTS,
Johns Hopkins Univ., Baltimore, Md.
For primary bibliographic entry see Field 5C.
W77-02808

THE EFFECT OF DISSOLVED ORGANIC MATTER IN SEA WATER ON THE UPTAKE OF MIXED INDIVIDUAL HYDROCARBONS AND NUMBER 2 FUEL OIL BY A MARINE FILTER-FEEDING BIVALVE (MERCENARIA MERCENARIA),
Rhode Island Univ., Kingston. Graduate School of Oceanography.
For primary bibliographic entry see Field 5C.
W77-02817

EFFECTS OF PASSAGE THROUGH POWER PLANT COOLING SYSTEMS ON ESTUARINE COPEPODS,
Maryland Univ., Solomons. Chesapeake Biological Lab.
For primary bibliographic entry see Field 5C.
W77-02820

THE CAPACITY OF SALT MARSH VEGETATION TO MODIFY THE QUALITY OF ESTUARINE WATERS,
Rhode Island Univ., Kingston. Dept. of Plant and Soil Science.
R. J. Hull.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 997, Price codes: A03 in paper copy, A01 in microfiche. Completion Report, September 30, 1976. 34 p, 6 fig, 10 tab, 6 ref. OWRT B-062-RI(1). 14-31-0001-4173.

Descriptors: Nitrogen, Phosphorus, Cadmium, Zinc, *Absorption, Eutrophication, Ions, *Heavy metals, *Nutrients, *Salt marshes, *Marsh plants, Estuaries, Estuarine environment, *Pollutant identification, Sediments, Tide waters, Water quality, Water pollution.
Identifiers: Spartina alterniflora, Spartina patens, Marsh grasses, *Salt water cordgrass.

The ability of tidal marsh vegetation to absorb nutrient and heavy metal ions introduced to the marsh by tidal flood waters was investigated. Water soluble salts of N, P, Cd, and Zn were ap-

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plied to the marsh surface during low tide, and infiltration into the sediment was measured by analyzing water samples taken from wells placed 15, 30, 60 and 90 cm into the sediment. Ammonium, applied as urea, and phosphate penetrated the marsh sediment readily with most concentrated in the upper 15 to 30 cm. Spartina alterniflora growing on the marsh absorbed approximately 40% of the NH4+ and 20% of the P applied. S. alterniflora and S. patens absorbed NH4+ preferentially from solutions containing 10 to 15% NaCl. S. patens absorbed NH4+ at normal rates regardless of the solution oxygen tension. Cd and Zn applied to the marsh surface was not detected in sediment water and plant uptake was less than 1% of that applied. Radio Cd and Zn was absorbed from nutrient solution by S. alterniflora and moved via symplast and apoplast throughout the plant. Nutrient sink properties of tidal marshes are confirmed.
W77-02830

NYCTHEMERAL VARIATION OF THE PHYTOPLANKTON IN CAMPECHE BAY, MEXICO, (IN SPANISH),
Universidad Nacional Autonoma de Mexico, Mexico City. Instituto de Biologia.
For primary bibliographic entry see Field 5C.
W77-02854

1976 ENVIRONMENTAL CONDITIONS RELATIVE TO SHRIMP PRODUCTION IN COASTAL LOUISIANA,
Louisiana Wildlife and Fisheries Commission, New Orleans. Div. of Oysters, Water Bottoms and Seafoods.
For primary bibliographic entry see Field 5C.
W77-02876

AN INVENTORY AND STUDY OF THE LAKE PONTCHARTRAIN-LAKE MAUREPAS ESTUARINE COMPLEX,
Louisiana Wildlife and Fisheries Commission, New Orleans, Div of Oysters, Water Bottoms and Seafoods.
For primary bibliographic entry see Field 5C.
W77-02879

ROLE OF STOCK BIOMASS AND TEMPERATURE IN RECRUITMENT OF SOUTHERN GULF OF ST. LAWRENCE ATLANTIC COD, GADUS MORHUA,
Fisheries and Marine Service, St. Andrews (New Brunswick). Biological Station.
For primary bibliographic entry see Field 5C.
W77-02883

BARATARIA BASIN: SALINITY CHANGES AND OYSTER DISTRIBUTION,
Louisiana State Univ., Baton Rouge. Center for Wetland Resources.
For primary bibliographic entry see Field 5C.
W77-02884

DISTINCTIVE FEATURES OF SELF-PURIFICATION OF WATER AND SEDIMENTS OF A SHALLOW SEA AS EXEMPLIFIED BY THE SEA OF AZOV, (IN RUSSIAN),
Azovskii Nauchno-Issledovatelskii Institut Rybnogo Khozyaistva, Rostov-na-Donu (USSR).
For primary bibliographic entry see Field 5G.
W77-02897

STUDY OF A RELATIONSHIP BETWEEN CHEMICAL AND BACTERIOLOGICAL POLLUTION IN THE COASTAL ZONES, (IN FRENCH),
CEA Centre de Pierrelatte (France).
For primary bibliographic entry see Field 5A.
W77-02903

YEASTS AND FUNGI IN MARINE ENVIRONMENTS, (IN FRENCH),
Centre Hospitalo-Universitaire-Poitiers (France). Lab. of Bacteriology.
For primary bibliographic entry see Field 5B.
W77-02904

DISTRIBUTION OF AMPHIPODA IN THE DNIESTER ESTUARY AND ITS POSSIBLE CHANGES IN CONNECTION WITH THE REGULATION OF THE DNIESTER RIVER, (IN RUSSIAN),
Institute of Biology of the Southern Seas, Sevastopol (USSR).
For primary bibliographic entry see Field 5C.
W77-02914

ON THE LIVING ENVIRONMENT FOR FISH IN THE COASTAL WATERS SURROUNDING THE NEW AND OLD VOLCANIC ISLAND 'NISI-NOSIMA', (IN JAPANESE),
Tokyo Univ. of Fisheries (Japan). Lab. of Research and Training Vessel Shinyo-maru.
For primary bibliographic entry see Field 5C.
W77-02917

STUDY AND EVALUATION OF REMEDIAL SAND BYPASSING PROCEDURES,
Scripps Institution of Oceanography, La Jolla, Calif
R. W. Harris, D. L. Inman, J. A. Bailard, and R. L. Oda.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A026 480, Price codes: A07 in paper copy, A01 in microfiche. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi, Contract Report H-76-1, May 1976. 128 p, 65 fig, 18 ref.

Descriptors: *Littoral drift, *Sediment transport, Sand waves, *Sands.

The purpose of this program was to investigate and develop a practical method for the management of sand influenced by littoral transport. The work covered laboratory research, field investigations, and tests. Initially, laboratory investigations of jet pumps, crater-sinks, and fluidization were conducted utilizing specially designed apparatus. During the laboratory investigations a new principle of fluidization was developed. This new form of fluidization is called 'duct-flow' fluidization. Field tests of craters dredged on the ocean floor showed that wave action causes the crater to elongate in a direction parallel to the wave crests. Later, the jet pump and fluidization apparatus were operated individually in the field. Finally, a prototype field sand bypassing system consisting of a fluidizer intercepting littoral drift on a sand spit was used to feed a crater. Sand was removed by a jet pump and deposited on shore 89 meters away. Aerial photographs were taken, and beach profiles, crater, and fluidized trench were measured throughout the field tests. The field tests demonstrated that the prototype system effectively intercepted littoral drift. (WES)
W77-02933

NUMERICAL MODELING OF RESONANT OSCILLATIONS IN DEEP DRAFT HARBORS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02935

MODEL MATERIALS EVALUATION SAND TESTS; HYDRAULIC LABORATORY INVESTIGATION,
Coastal Engineering Research Center, Fort Belvoir, Va., and Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8G.
W77-02938

COOPER RIVER REDIVERSION PROJECT BUSHY PARK WATER SUPPLY TESTS HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02939

STABILITY OF RUBBLE-MOUND BREAKWATER LAHAINA HARBOR, HAWAII HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02940

A VARIATIONAL APPROACH TO NONLINEAR WAVE THEORY,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02942

TRANSMISSION OF WAVE ENERGY THROUGH AND OVERTOPPING OF THE LONG BEACH, CALIFORNIA, BREAKWATER HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02945

FEASIBILITY OF MONITORING FLOW PATTERNS AND SEDIMENT AND POLLUTANT DISPERSION OF WATER BODIES WITH 2 CHANNEL SPECTRAL DATA,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 5B.
W77-02946

EFFECTS OF 40-FOOT CHARLESTON HARBOR PROJECT ON TIDES, CURRENTS AND SALINITIES; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02947

NUMERICAL ANALYSIS OF TIDAL CIRCULATION FOR LONG BEACH HARBOR; REPORT 1, EXISTING CONDITIONS AND ALTERNATE PLANS FOR PIER J COMPLETION AND TANKER TERMINAL STUDY,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02948

NUMERICAL ANALYSIS OF TIDAL CIRCULATION FOR LONG BEACH HARBOR; REPORT 3, EXISTING CONDITIONS AND ALTERNATE PLANS FOR PIER J COMPLETION AND TANKER TERMINAL STUDY WITH -82 FT CHANNEL,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02949

LONG BEACH HARBOR NUMERICAL ANALYSIS OF HARBOR OSCILLATIONS; REPORT 1, EXISTING CONDITIONS AND PROPOSED IMPROVEMENTS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02950

LONG BEACH HARBOR NUMERICAL ANALYSIS OF HARBOR OSCILLATIONS; REPORT 3, ALTERNATE PLANS FOR PIER J COMPLETION AND TANKER TERMINAL PROJECT (62-AND 82-FT DEPTHS),
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02951

DESIGN FOR WAVE PROTECTION, FLOOD CONTROL, AND PREVENTION OF SHOALING, CATTARAUGUS CREEK HARBOR, NEW YORK; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02952

B. EVERETT JORDAN LAKE WATER-QUALITY STUDY,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 5B.
W77-02954

LOS ANGELES AND LONG BEACH HARBORS MODEL STUDY; REPORT 3, ANALYSES OF WAVE AND SHIP MOTION DATA,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02955

IMPROVEMENTS FOR MASONBORO INLET, NORTH CAROLINA; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02958

GRAYS HARBOR ESTUARY, WASHINGTON, REPORT 6, 45-FT MSL (40-FT MLLW) NAVIGATION CHANNEL IMPROVEMENT STUDIES; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02963

BEACH NOURISHMENT TECHNIQUES; REPORT 1, DREDGING SYSTEMS FOR BEACH NOURISHMENT FROM OFFSHORE SOURCES,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 2J.
W77-02965

DIGITAL-SIMULATION MODEL OF THE WENONAH-MOUNT LAUREL AQUIFER IN THE COASTAL PLAIN OF NEW JERSEY,
Geological Survey, Trenton, N. J. Water Resources Div.
For primary bibliographic entry see Field 2F.
W77-02975

FLUME STUDIES WITH FINE AND COARSE SANDS,
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 2J.
W77-02976

TEMPERATURE EFFECTS OF CRUDE OIL IN THE UPPER INTERTIDAL ZONE,
University of Southern California, Los Angeles. Allan Hancock Foundation.
For primary bibliographic entry see Field 5C.
W77-03004

IMPACTS OF CONSTRUCTION ACTIVITIES IN WETLANDS OF THE UNITED STATES,
Tereco Corp., College Station, Tex.
For primary bibliographic entry see Field 5C.
W77-03007

VIABLE EMBRYOGENESIS OF THE WINTER FLOUNDER PSEUDOPLEURONECTES AMERICANUS FROM -1.8 DEG TO 15 DEG C,
State University of New York at Stony Brook. Dept. of Ecology and Evolution.
For primary bibliographic entry see Field 5C.
W77-03029

INCREASED OPERCULAR RATES OF PINK SALMON (ONCORHYNCHUS GORBUSCHA) FRY AFTER EXPOSURE TO THE WATER-SOLUBLE FRACTION OF PRUDHOE BAY CRUDE OIL,
California State Univ., Chico. Dept. of Biological Sciences.
For primary bibliographic entry see Field 5C.
W77-03032

TEMPERATURE-INDUCED CHANGES IN ACUTE TOXICITY OF ZINC TO ATLANTIC SALMON (SALMO SALAR),
Guelph Univ., (Ontario). Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W77-03049

EFFECTS OF WATER TEMPERATURE AND HOUSING CONDITIONS UPON THE AGGRESSIVE BEHAVIOR OF THE LOBSTER HOMARUS AMERICANUS,
Dalhousie University, Halifax, Nova Scotia, Canada, Department of Psychology.
For primary bibliographic entry see Field 5C.
W77-03050

REGULATION OF OXYGEN CONSUMPTION BY INCIDENT ILLUMINATION IN EMBRYONATED OVA OF ATLANTIC SALMON SALMO SALAR L.,
Dalhousie Univ., Halifax, Nova Scotia. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W77-03051

WINTER FLOUNDER MOVEMENTS, GROWTH, AND MORTALITY OFF MASSACHUSETTS,
Massachusetts Dept. of Natural Resources, Sandwich. Div. of Marine Fisheries.
For primary bibliographic entry see Field 5C.
W77-03052

ABUNDANCE AND POPULATION DYNAMICS OF PARASITES INFECTING ATLANTIC SALMON (SALMO SALAR) IN TROUT BROOK, NEW BRUNSWICK, CANADA,
Fisheries and Marine Service, St. Andrews (New Brunswick). Biological Station.
For primary bibliographic entry see Field 5C.
W77-03053

THE EFFECT OF TEMPERATURE-SALINITY COMBINATIONS ON THE FUNCTIONAL WELL-BEING OF ADULT LYTECHINUS VARIEGATUS (LAMARCK) (ECHINODERMATA, ECHINOIDEA),
University of South Florida, Tampa. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W77-03054

REPRODUCTION OF WHITE PERCH IN THE LOWER HUDSON RIVER,
New York Power Pool, Schnectady, N. Y. Environmental Affairs Office.
J. G. Holsapple, and L. E. Foster.
New York Fish and Game Journal, Vol. 22, No. 2, July 1975, p 122-127, 6 tab, 5 ref.

Descriptors: *Baseline studies, *Reproduction, *Fish reproduction, *Hudson River, *White perch, Spawning, Temperature, Salinity, Estuaries, Water temperature, Water pollution effects.

Baseline information is presented on the reproductive potential of the white perch population of the Hudson River estuary, as derived from data collected between river miles 40 and 60 in 1972. The estimated average number of eggs spawned by 3-year-old fish was 20,676 and for 9-year-old fish was 135,389. Field observation indicated that the peak of white perch spawning occurred in June when water temperatures were 18C to 20C and salinity remained below 1.0 ppt. (Chilton-ORNL)
W77-03058

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

SOLAR DISTILLATION IN CHILE,
Universidad Tecnica Federico Santa Maria, Valparaiso (Chile). Solar Energy Research Center.
J. R. Hirschmann.
Desalination, Vol. 17, No. 1, p 17-30, August, 1975. 13 fig, 14 ref.

Descriptors: *Solar distillation, *Solar stills, *Desalination, *Desalination apparatus, Distillation, Water treatment, Desalination plants, Impaired water quality, Potable water, Saline water, Saline water systems, Water supply, Water purification, Desalination processes, Arid lands, Filtration, Water sources, Salinity, Salts.
Identifiers: *Chile.

Solar distillation in Chile is described. A historical overview of this process and a discussion of the apparatus used are given. 'Natural distillation' caused by coastal fog is explained and its various uses evaluated. The two types of direct distillation solar equipment: stills with an evaporation wick and basin-type stills, as well as indirect solar distillation, are considered. Conclusions are presented regarding the application of these processes in the arid regions of northern Chile. The cultivation of plants carried out under plastic tents and use of desalinated water are also discussed. (Jamail-Arizona)
W77-02862

DRINKING WATER SUPPLY IN KRASNOVODSK, (IN RUSSIAN),
Krasnovodsk Heat and Power Plant (USSR).
Yu. Sh. Kegamyan, A. I. Egorov, and L. S. Alekseev.
Probl Osvo Pustyn' 5, p 75-77. 1975.

Descriptors: *Potable water, Water supply, *Distillation, *Desalination plants.
Identifiers: Krasnovodsk, Turkmen-SSR, USSR, *Caspian Sea.

The distilling plant which produces drinking water from distillate from desalinizers of Caspian Sea water is described by a flow diagram.--Copyright 1976, Biological Abstracts, Inc.
W77-02902

PHYSIOLOGICAL ASSESSMENT OF CALCIUM CONTENT IN DISTILLED DRINKING WATER, (IN RUSSIAN),
For primary bibliographic entry see Field 5F.

W77-02909

STUDY OF THE EFFECT OF DESALTED DRINKING WATER ON THE HEALTH OF THE POPULATION, (IN RUSSIAN),
Moskovskii Gosudarstvennyi Meditsinskii Institut (I) (USSR). Dept. of Public Hygiene.
For primary bibliographic entry see Field 5F.
W77-03037

3B. Water Yield Improvement

LABORATORY EVALUATION OF WAX AND SILICONE FOR WATER HARVESTING ON COAL MINE SPOIL,
Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colo.
D. G. Scholl.
Research Note RM-267, 4 p, August, 1976. 3 fig, 4 ref.

Descriptors: *Water harvesting, *Coal mine wastes, *Spoil banks, Runoff, Water yield improvement, *New Mexico, Reclamation, Revegetation.
Identifiers: *Waxes, *Silicones.

New Mexico coal mine spoil treated with either silicone or wax developed water-repellent crusts; the wax crust withstood disturbance better and retained more repellency. Increasing the application rate generally improved performance of both crusts. Both treatments appear suitable for harvesting water to aid plant establishment on coal mine spoil. (Witt-IPC)
W77-02589

COMPARATIVE MORPHOLOGICAL AND ECOPHYSIOLOGICAL ASPECTS OF TWO SCLEROPHYLLOUS CHILEAN SHRUBS,
Universidad Catolica de Chile, Santiago. Laboratorio de Botanica; and Universidad Catolica de Chile, Santiago. Inst. of Biological Sciences.
F. Riveros.
Flora, Vol. 165, No. 3, p 223-234, 1976. 8 fig, 3 tab, 19 ref.

Descriptors: *Consumptive use, *Moisture stress, *Water balance, *Soil moisture, Arid lands, Droughts, Transpiration, Rainfall, Xylem, Precipitation(Atmospheric), Soil-water-plant relationships, Plant morphology, Plant physiology, Leaves, Stomata, Root systems, *Shrubs.
Identifiers: *Cryptocarya alba, *Quillaja saponaria, Chile.

Of two evergreen woody species of Chilean mediterranean shrub, Cryptocarya alba is confined to more humid sites, while Quillaja saponaria grows also abundantly on sunny arid slopes. Morphological and functional aspects are analyzed in order to understand the mechanisms that allow these plants to grow under semiarid climatic conditions. In regions with mediterranean climates the soil profiles are moistened by winter and spring rainfall. At the beginning of summer the soil dries out, starting from the surface. At the beginning of the drought period stomatal control reduces the loss of water. Q. saponaria, due to its deeper root system, gets to the deeper soil profile layers which retain moisture even during the summer. For this reason the water balance is maintained without significant fluctuations throughout the year. The findings contribute to an understanding of why C. alba is confined to areas of higher moisture, while Q. saponaria is able to grow in places of much greater aridity. (Jamail-Arizona)
W77-02858

CONSERVING WATER BY ANTITRANSPIRANT TREATMENT OF PHREATOPHYTES,
California Univ., Davis. Water Science and Engineering Section.
D. C. Davenport, P. E. Martin, E. B. Roberts, and R. M. Hagan.
Water Resources Research, Vol. 12, No. 5, p 985-990, October, 1976. 6 fig, 9 tab, 32 ref.

Descriptors: *Antitranspirants, *Phreatophytes, *Application methods, *Water conservation, Transpiration control, Transpiration, Water yield improvement, Foliar, Foliar application, Canopy, Cottonwoods, Spraying, Hydrology, Watersheds(Basins), Stomata.
Identifiers: Salt cedar, Willow.

The use of antitranspirants in hydrology seeks to curtail transpiration from forested watersheds and riparian vegetation, such as salt cedar, without removing the vegetation or damaging the ecological balance. There are two main groups of antitranspirants: (1) stomatal inhibitors, which prevent the stomatal pore from opening fully, and (2) film-forming materials, which externally cover or plug stomatal pores. Basic information is provided on foliar coverage of three phreatophytes (salt cedar, willow, and cottonwood) by a wax-based film-forming antitranspirant and the effects of this coverage on transpiration, diffusive resistance, and water potential. Antitranspirants were applied by hand sprayer or backpack mist blower. Transpiration was measured by periodic weighing of potted plants and by gas hygrometer Resistance to water vapor diffusion from the foliage was measured by a porometer and plant water potential by a pressure chamber. The results are presented. Foliar application by hand sprayer or backpack mist blower of a wax-based antitranspirant increased resistance to water vapor diffusion from phreatophyte foliage and decreased transpiration, indicating the potential of this nondestructive approach to water conservation (Jamail-Arizona)
W77-02863

AERIAL SPRAYING OF PHREATOPHYTES WITH ANTITRANSPIRANT,
California Univ., Davis. Water Science and Engineering Section.
D. C. Davenport, P. E. Martin, and R. M. Hagan.
Water Resources Research, Vol 12, No 5, p 991-996, October, 1976. 6 fig, 6 tab, 7 ref.

Descriptors: *Antitranspirants, *Spraying, *Phreatophytes, *Application methods, Consumptive use, Streamflow, Groundwater, Groundwater basins, Water conservation, Water yield improvement, Transpiration, Transpiration control, Chemcontrol, Cottonwoods, Canopy, Foliar, Foliar application.
Identifiers: Salt cedar, Willow, *Aerial spraying.

The use of antitranspirants for water conservation by reducing phreatophyte transpiration is discussed. Experiments were conducted to determine whether aerial spraying of a wax-based antitranspirant emulsion would provide adequate spray coverage and reduce transpiration. Multiple passes were made with (1) a fixed wing plane on salt cedar, cottonwood, and willow and (2) a helicopter on salt cedar. Spray coverage was also conducted on the ground. Scanning electron microscope photomicrographs showed considerable antitranspirant on foilage in the upper canopy and lesser amounts in the lower; the film was detected even 24 days after spraying. Aerially applied antitranspirant increased resistance to leaf water vapor diffusion by 150 percent during the first few days and by 80 percent thereafter. Results then show that (1) good coverage can be achieved by multiple passes of the aircraft and deep antitranspirant spray penetration into dense canopies is not as important as coverage of the outer foilage and (2) transpiration rates can be retarded without foliar damage. However, full assessment of the antitranspirant spraying must await more extensive field trials. (Jamail-Arizona)
W77-02867

WATER QUALITY EFFECT OF DIKING A SHALLOW ARID-REGION LAKE,
Brigham Young Univ., Provo, Utah.
For primary bibliographic entry see Field 5C.
W77-02871

COLORADO RIVER BASIN PILOT PROJECT, COMPREHENSIVE EVALUATION REPORT, FIVE WINTER SEASONS 1970-71 TO 1974-75,
Aerometric Research Inc., Goleta, Calif.
R. D. Elliott, R. W. Shaffer, A. Court, and J. F. Hannaford
Prepared for Bureau of Reclamation, Denver, Colorado, Div. of Atmospheric Water Resources Management. Report ARI-76-1, October 1976. 641 p, 72 fig, 47 tab, 53 ref, 4 append. Bur Reclaim Contract 14-06-D-7332.

Descriptors: Atmosphere, Clouds, Meteorology, *Nucleation, Orography, Precipitation(Atmospheric), River basins, Runoff, Silver iodide, Snow, Snowpacks, *Weather modification, *Colorado River Basin, Wind velocity, Meteorological data.
Identifiers: San Juan Mountains(Colo), *Nucleant dispersion.

The primary objectives of this evaluation have been to (1) test the physical concepts of weather modification potential, and (2) test the practical weather modification potential for an operations program, as carried out in the Colorado River Basin Pilot Project during the five winters of 1970-71 through 1974-75. The first objective is approached through an investigation of nucleant dispersion based on wind flow, an analysis of precipitation and rawinsonde data that is essentially diagnostic in character, and an analysis of surface runoff related to precipitation. The second objective is carried out through detailed analyses of precipitation and other records for all five years of the pilot project operation. Conclusions and recommendations are presented which can serve as guidance material for planning orographic research projects. (Bur Reclam)
W77-03060

3C. Use Of Water Of Impaired Quality

TRICKLE-DRIP IRRIGATION: PRINCIPLES AND APPLICATION TO WATER MANAGEMENT IN TROPICAL SOILS,
Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
For primary bibliographic entry see Field 3F.
W77-02868

EFFECT OF IRRIGATION ON SOME PROPERTIES OF SOUTHERN CHERNOZEMS, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Soil Science.
For primary bibliographic entry see Field 2G.
W77-02889

ADAPTATION TO INCREASING SALINITY OF THE COLORADO RIVER,
California Univ., Davis. Dept. of Land, Air and Water Resources.
F. E. Robinson, J. N. Luthin, R. J. Schnagl, W. Padgett, and K. K. Tanji.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 082, Price codes: A04 in paper copy, A01 in microfiche. California Water Resources Center, Contribution 160, Completion Report, October 1976. 51 p, 3 fig, 32 tab, 20 ref, 2 append. USDA Regional Research Project 129. (California Water Resources Center Projects UCAL-WRC-W-418 and W-482). OWRT A-052-CAL(2) an
s: *Salinity, *Saline soils, *Crop production, *Sprinkler irrigation, Salts, *California, Colorado River, *Salt tolerance, Leaching, Soil profiles.

Identifiers: *Imperial Valley(Calif).
W77-02997

SOIL WATER EXTRACTION BY ALFALFA,
North Dakota State Univ., Fargo. Dept. of Soils.
L. J. Brun, and B. K. Worcester.
Agronomy Journal, Vol. 67, No. 4, p 586-589, July-August 1975. 3 fig, 2 tab, 9 ref.

Descriptors: *Saline soils, *Salinity, *Alfalfa, Crop response, Crop production, *Soil water, Moisture tension, North Dakota, Montana.

Saline seeps have developed because of the accumulation of water beyond the rooting zone of annual crops. The purpose of this experiment was to show the potential of alfalfa to extract soil water under a variety of textural and salinity conditions. Core samples were taken in alfalfa fields and fields under crop-fallow management to evaluate their present water content, 15 atm. percentage, texture, and salinity level. Significant extraction of soil water occurs to depths of 3 to 4 m. Alfalfa extracted soil water held at a tension greater than 15 atm. in both saline and non-saline segments of the soil profile. A minimum soil moisture level was reached at the 1.22 to 2.44 m depth in alfalfa fields maintained 5 years. Alfalfa is an invaluable crop for reducing soil wetness to alleviate the saline-seep problems of western North Dakota and eastern Montana. (Skogerboe-Colo St)
W77-03064

MINIMAL LEACHING WITH VARYING ROOT DEPTHS OF ALFALFA,
Agricultural Research Service, Riverside, Calif. Salinity Lab.
L. Bernstein, L. E. Francois, and R. A. Clark.
Soil Science Society of America Proceedings, Vol 39, No. 1, p 112-115 January-February 1975. 3 fig, 2 tab, 5 ref.

Descriptors: *Leaching, *Alfalfa, Salinity, Lysimeters, Return flow, Saline water, Crop response, Salt tolerance, *Root development.

Alfalfa was grown in greenhouse lysimeters with soil depths of 60, 120, and 180 cm to determine whether rooting depth affected tolerance to the low leaching percentage of 6.25. Salinities of the drainage waters averaged about 6 mmho/cm for the controls irrigated with 0.4 mmho/cm water, and 26 mmho/cm for lysimeters irrigated with 2.0 mmho/cm water. Steady-state salinity profiles were maintained for 3 years. Yields with the more saline water averaged 23% less than those of the controls, in good agreement with previous findings, but were not significantly affected by lysimeter depth. Water requirements and uptake of chloride and sodium were only slightly affected by lysimeter depth. Salinity profiles with maximum salinities of 26 mmho/cm in the soil water can, therefore, be compressed into a little as a 60-cm depth with no greater effects on yield or salt uptake by the crop than those obtained with salinity profiles extended over 120 or 180 cm. (Skogerboe-Colo St)
W77-03066

COMBINED EFFECTS OF LOW OXYGEN AND SALINITY ON GERMINATION OF A SEMI-DWARF MEXICAN WHEAT,
Escuela Nacional de Agricultura, Chapingo (Mexico). Colegio de Postgraduados.
A. Aceves-N, L. H. Stolzy, and G. R. Mehuys.
Agronomy Journal Vol. 67, No. 4, p 530-532, July-August, 1975. 4 fig, 1 tab, 7 ref.

Descriptors: *Oxygen, *Oxygen requirements, Wheat, Crop response, Salinity, Soil salinity, Germination, Seeds.
Identifiers: *Soil aeration, Mexican wheat(Semi-dwarf).

The simultaneous occurrence of low oxygen and high salinity conditions is common in a wide range of irrigated soils. The combined effects of 02 and osmotic potential stresses on germination of wheat were tested under growth chamber conditions. A range of 02 concentrations and salinity levels were chosen to simulate soil aeration and salinity combinations that might be expected to occur in well-aerated, fine-textured, saline, and saline-sodic soils. Daily observations of number of seeds germinated and days to first germination were recorded. (Skogerboe-Colo St)
W77-03068

3D. Conservation In Domestic and Municipal Use

MUNICIPAL WASTEWATER RECYCLING: A STRATEGY FOR MEETING THE ZERO DISCHARGE GOAL OF PL 92-500,
California Univ., Los Angeles. School of Architecture and Urban Planning.
For primary bibliographic entry see Field 5D.
W77-02620

HYDROLOGY,
Geological Survey, Raleigh, N.C. Water Resources Div.
For primary bibliographic entry see Field 6B.
W77-02968

WATER QUANTITY REQUIREMENTS FOR PUBLIC SUPPLIES AND OTHER USES,
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 6D.
W77-02969

3E. Conservation In Industry

SOME INTERNAL MEASURES FOR REDUCING EFFLUENT LOAD, FOR EXAMPLE, IN A CALCIUM BISULFITE MILL (EINIGE INNERBETRIEBLICHE MASSNAHMEN ZUR VERMINDERUNG DER VORFLUTERBELASTUNG, DARGESTELLT AM BEISPIEL EINER CALCIUMBISULFITFABRIK),
Schwaebische Zellstoff A. G., Ehingen/Donau (West Germany).
For primary bibliographic entry see Field 5D.
W77-02576

WATER RESOURCE MANAGEMENT IN THE CZECHOSLOVAKIAN PAPER INDUSTRY DURING THE FIFTH FIVE-YEAR PLAN PERIOD (VODNI HOSPODARSTVI PAPIRENSKEHO PRUMYSLU CSR V PATE PETILETCE),
F. Nemec.
Papir a Celuloza, Vol. 31, No. 6, p 130-131, 1976. 2 tab.

Descriptors: *Pulp and paper industry, *Water conservation, Fresh water, Water pollution sources, Foreign countries, Europe, Dissolved solids, Water pollution control, Water pollution treatment, Water management(Applied), Effluents.
Identifiers: *Czechoslovakia, Sulfite mills, Kraft mills, Fiber recovery.

During the 1971-1975 period, the fresh water consumption and the fiber loss in the Czechoslovakian paper industry increased by 9.5% and 16.5%, respectively, while the total industry output increased by 31.2%. This relative improvement was achieved by the combination of in-plant water conservation measures and improved primary effluent treatment. The discharge of dissolved solids was reduced by closing several small sulfite pulp mills and replacing their capacity with a new modern kraft mill in Steti, equipped with a complete primary and secondary effluent treatment system. (Trubacek-IPC)
W77-02578

POSSIBILITY OF INTRODUCING WASTE-FREE TECHNOLOGY IN THE PULP AND PAPER INDUSTRY (VOZMOZHNOSTI VNEDRENIYA BEZOTKHODNOI TEKHNOLOGII V OTRASLI),
A. Ya. Tipisev, Ya. V. Nikitin, and N. K. Grigor'eva.
Bumazhnaya Promyshlennost, No 5, p 15-17, May, 1976.

Descriptors: *Pulp and paper industry, *Water pollution control, Effluents, Water conservation, Water reuse, Recycling, Solid wastes, Sludge, Fertilizers, Feeds, Additives, Incineration, Wastes, Waste disposal, Industrial wastes, Pulp wastes, Chlorine, Ammonia.
Identifiers: *Soviet Union(USSR), Pulp bleaching, Chlorine dioxide, Closed systems.

The concept of waste-free technology, as defined by the Commission on Economics of the European Common Market, is discussed, and measures already introduced towards this goal at Russian mills are indicated. Measures aimed at reducing the consumption of fresh water include dry barking, diffusion washing of pulp (in digesters or in separate diffusors), screening and beating at high consistency, manufacture of paper by the dry process, and purification and recycling of fiber-containing effluents. The Selenga pulp and board mill, located near Lake Baikal (USSR), is to be converted soon to entirely effluent-free operation, and will reduce its water consumption to 14-19 cu m/ton of product. The problem of solid wastes utilization is far from being solved. Research aimed at such utilization includes experiments on the utilization of effluent sediments as fertilizers and animal feed additives, on the recovery and utilization of gaseous by-products, and on new methods of pulping and pulp bleaching. Worth mentioning are studies on pulp bleaching with gaseous agents (such as chlorine, chlorine dioxide, ammonia) and the introduction of a fluidized-bed process for combustion of effluent sediments at the Svetogorsk and Kotlas mills. (Stapinski-IPC)
W77-02583

AUTOMATION OF TOTAL PHENOLIC CONTENT DETERMINATION WITH THE FOLIN-CIOCALTEU REAGENT. APPLICATION TO THE STUDY OF WASTE WATERS FROM FIBERBOARD MILLS (AUTOMATISATION DE LA METHODE DE DOSAGE DES COMPOSES PHENOLIQUES TOTAUX PAR LE REACTIF DE FOLIN-CIOCALTEU. APPLICATION A L'ETUDE DES EAUX RESIDUAIRES DES USINES DE PANNEAUX DE FIBRES DE BOIS),
Institut National de la Recherche Agronomique, Dijon (France). Technologie.
For primary bibliographic entry see Field 5A.
W77-02584

INVESTIGATION OF COMMERCIAL CHROME-TANNING SYSTEMS: PART VI. FULL-SCALE TRIALS OF CHROME LIQUOR RECYCLING AND THE IMPORTANCE OF SALT CONCENTRATION,
Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia). Div. of Protein Chemistry.
For primary bibliographic entry see Field 5D.
W77-02594

THE CONTROL OF WATER POLLUTION AND THE DISPOSAL OF SOLID WASTES IN THE INDUSTRIES PRODUCING BASIC INORGANIC CHEMICALS,
Imperial Chemical Industries Ltd., London (England). Engineering Services Dept.
For primary bibliographic entry see Field 5D.
W77-02595

APPLICATION OF ULTRA FILTRATION/REVERSE OSMOSIS TECHNIQUE FOR THE FRACTIONATION OF CHEESE WHEY - A WASTE DISPOSAL OF THE DAIRY INDUSTRY,
Central Salt and Marine Chemicals Research Inst., Bhavnagar (India).
For primary bibliographic entry see Field 5D.
W77-02598

IMPACT OF WATER CONSERVATION IN THE DESIGN OF MODERN OIL REFINERIES,
Fluor Engineers and Constructors, Inc., Los Angeles, Calif.
For primary bibliographic entry see Field 5D.
W77-02602

EIGHTH MEETING OF THE IULTCS TANNERY WASTES COMMISSION, SVENDBORG, DENMARK, 21ST TO 23RD MAY 1975.
For primary bibliographic entry see Field 5D.
W77-02603

BIOLOGICAL PROCESS FOR EFFLUENT AND WASTE TREATMENT AS APPLIED IN THE PAPER INDUSTRY,
For primary bibliographic entry see Field 5D.
W77-02607

THE MANUFACTURE AND USE OF SELECTED ALKYLTIN COMPOUNDS, TASK II,
Midwest Research Inst., Kansas City, Mo.
For primary bibliographic entry see Field 5B.
W77-02634

ECONOMIC MODELS OF WASTER USE, (RANN UTILIZATION EXPERIENCE, CASE STUDY NUMBER 4),
Houston Univ., Tex.
For primary bibliographic entry see Field 6C.
W77-02640

PROCEEDINGS OF: NATIONAL CONFERENCE ON HEALTH, ENVIRONMENTAL EFFECTS, AND CONTROL TECHNOLOGY OF ENERGY USE.
Environmental Protection Agency, Washington, D. C. Office of Energy, Minerals and Industry.
For primary bibliographic entry see Field 5G.
W77-02649

AN ENVIRONMENTAL OVERVIEW OF UNITED STATES ENERGY FUTURES,
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W77-02650

MONITORING WESTERN ENERGY RESOURCE DEVELOPMENTS,
Environmental Monitoring and Support Lab., Las Vegas, Nev.
For primary bibliographic entry see Field 5G.
W77-02651

WILDLIFE AND OIL SHALE. A PROBLEM ANALYSIS AND RESEARCH PROGRAM.
Thorne Ecological Inst., Boulder, Colo.
For primary bibliographic entry see Field 5G.
W77-02659

REVIEW OF ENVIRONMENTAL CONTROL OF MERCURY IN JAPAN,
Environmental Protection Service, Ottawa (Ontario).
For primary bibliographic entry see Field 5G.
W77-02761

MODIFICATION OF THE TRADITIONAL SEQUENCE FOR THE TREATMENT OF WASTEWATERS FROM METAL FINISHING INSTALLATIONS,
Environmental Protection Service, Ottawa (Ontario).
For primary bibliographic entry see Field 5D.
W77-02762

REMOVAL AND RECOVERY OF METALS FROM SLUDGE AND SLUDGE INCINERATOR ASH,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5D.
W77-02763

HEAT AND MASS TRANSFER IN MODELS OF UNDEVELOPED GEOTHERMAL FIELDS,
Colorado Univ., Boulder. Dept. of Engineering.
For primary bibliographic entry see Field 4B.
W77-02805

IMPLICATIONS OF THE WATER POLLUTION CONTROL ACT OF 1972 FOR THE MINERAL RESOURCES INDUSTRY, A SURVEY.
Bureau of Mines, Washington, D.C. Div. of Melallurgy.
For primary bibliographic entry see Field 5G.
W77-02806

THE EFFECTS ON AGRICULTURE IN UTAH OF WATER TRANSFERS TO OIL SHALE DEVELOPMENT,
Utah State Univ., Logan. Dept. of Economics.
For primary bibliographic entry see Field 6D.
W77-02829

WATER QUANTITY REQUIREMENTS FOR PUBLIC SUPPLIES AND OTHER USES,
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 6D.
W77-02969

HYDROLOGIC STUDIES OF THE U.S. GEOLOGICAL SURVEY RELATED TO COAL DEVELOPMENT IN COLORADO.
Geological Survey, Lakewood, Colo. Water Resources Div
For primary bibliographic entry see Field 5G.
W77-02970

3F. Conservation In Agriculture

USDA RESEARCH AND DEVELOPMENT ON EFFECTS OF ENERGY PRODUCTION AND USE OF FRESHWATER RESOURCES,
Forest Service (USDA), Washington, D.C.
For primary bibliographic entry see Field 5G.
W77-02656

SEASONAL WATER USE OF IRRIGATED PASTURE GRASSES UNDER PERMANENTLY-SET IRRIGATION AS RELATED TO CLIMATIC FACTORS,
Nebraska Univ., Lincoln. Dept. of Agronomy.
J. T. Nichols.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 989, Price codes: A02 in paper copy, A01 in microfiche. Completion Report, August 1976. 8 p, 11 ref. OWRT A-032-NEB(1). 14-34-0001-6028.

Descriptors: Irrigation, *Grasses, *Irrigation water, Water wastes, Seasonal, *Crop production, *Water utilization, Irrigated land, Pastures.
Identifiers: *Production efficiency(Irrigation water).

From 1973 to 1975 seasonal and peak water use by eight grasses were determined under irrigated pasture conditions while being grazed by yearling steers during spring and summer and weaned calves in the fall. Weather parameters of air temperature, relative humidity, wind and radiation were measured to determine their relationship to water use by these cool-season grasses. Total water use among grasses was not significantly different, but yearly differences occurred with average water use of 43.16 inches in 1974 and 37.50 inches in 1975. The periods of peak water use were July 22-29, 1974 (0.46 inches per day) and June 16-24, 1975 (0.31 inches per day). Water use rates were correlated with evaporation (r = .63), mean daily temperature (r = .54), and maximum temperature (r = .53) for season-long measurements, mean wind (r = .58) for June, and maximum wind (r = .62) for July. In regression analysis, evaporation, years, mean relative humidity and mean wind were major sources of variance for season-long water use. Production efficiency of irrigation water applied is ultimately expressed in the efficiency of animal gain per unit of water applied. Animal weight gain per acre-inch of irrigation water applied. was: intermediate wheatgrass 39.14; orchard-grass 32.99; Garrison creeping foxtail 32.29; meadow bromegrass 32.00; smooth bromegrass 31.27; Reed canarygrass 26.49; Russian wildrye 25.06; and tall fescue 18.65.
W77-02834

WATER UNDER THE SAND,
For primary bibliographic entry see Field 4B.
W77-02852

STRUCTURAL COMPOSITION AND SOME PROBLEMS OF THE WATER REGIME OF DARK-CHESTNUT SOILS OF THE KUSTANAI OBLAST IN CONNECTION WITH THE DURATION OF THEIR CULTIVATION, (IN RUSSIAN),
For primary bibliographic entry see Field 2G.
W77-02853

DISTRIBUTION OF WATER AND IONS IN SOILS IRRIGATED AND FERTILIZED FROM A TRICKLE SOURCE,
Agricultural Research Organization, Bet Dagan (Israel). Div. of Soil Chemistry and Plant Nutrition.
B. Bar-Yosef, and M. R. Sheikholslami.
Soil Science Society of America, Journal, Vol. 40, No. 4, p 575-582, 1976. 4 fig, 12 tab, 11 ref.

Descriptors: *Irrigation practices, *Irrigation efficiency, *Irrigation systems, *Subsurface irrigation, *Application methods, Irrigation, Water distribution(Applied), Infiltration, Ion transport, Mathematical models, Moisture content, Soil types, Discharge(Water), Clays, Denitrification, Sands, Phosphates, Nitrates, Hydraulic conductivity.
Identifiers: *Trickle irrigation.

Trickle irrigation is becoming increasingly important in modern agriculture, but the simultaneous distribution of water and nutrients emerging from a trickle source has been insufficiently studied. This paper reports a laboratory study of simultaneous distributions of water, NO3-N and P in clay and sandy soils irrigated daily from a trickle source. Hydraulic conductivity data, water retention curves and absorption isotherms to the soils were determined to enable verification of mathematical models against the experimental results obtained under various conditions. Adding identical amounts of water but increasing the trickle discharge rate in the sandy soil from 250 to 2,500 milliliters per hour increased the vertical movement of the wetting front and decreased horizontal movement. In a sequence of three cycles of irrigation with a nutrient solution, losses of nitrate were observed in the clay soil, probably due to denitrification processes. The restricted mobility of the

osphate ions, even in the sandy soil, implies that preirrigation mixing of P in the soil, supplented by its addition to the irrigation solution, is cessary to obtain a uniform P concentration in e soil volume. (Jamail-Arizona)
77-02855

OMPARISON OF IRRIGATION SCHEDULES ASED ON PAN EVAPORATION AND ROWTH STAGES IN WINTER WHEAT,
njab Agricultural Univ., Ludhiana (India).
S. Prihar, K. L. Khera, K. S. Sandhu, and B. S. ndhu.
gronomy Journal, Vol. 68, No. 4, p 650-653, July-igust 1976. 2 fig, 3 tab, 11 ref.

escriptors: *Irrigation efficiency, *Irrigation effcts, *Wheat, *Evaporation pans, *Growth ges, Crop response, Water conservation, Irrigan practices, Water management(Applied), Crop oduction, Irrigation water.
entifiers: *Irrigation schedules, Winter wheat, n evaporation ratio.

ater use efficiency is improved by irrigation of nter wheat (Triticum aestivum) using a ratio of me fixed amount of irrigation water (IW) to pan aporation, PAN-E, (cumulative evaporation om U.S. Weather Bureau class A pan less rain ce previous irrigation) and scheduling according growth stages. In a 2-year field study, IW/PAN-ratios of 0.75 and 0.9 for scheduling irrigation to nter wheat irrespective of growth stage were mpared with a combination of IW/PAN-E with owth stages and the conventional technique of igating at five growth stages. The 0.75 ratio irspective of growth stage produced as large a in yield as irrigation at five growth stages while ng an average of 12 cm less irrigation. Combin-IW/PAN-E with growth stages did not improve yield. The major advantage of this approach is t the farmer need not change the amount of ter from one application to the next. With rain interval for the next irrigation would increase. hns-Arizona)
77-02857

ONSUMPTION USE AND WATER REQUIREENT OF DWARF WHEAT IN LIGHT TEXRE SOILS OF RAJASTHAN,
K. N. Coll. of Agriculture, Jobner (India).
C. Jain, and K. C. Jain.
nals of Arid Zone, Vol. 14, No. 3, p 212-220, ptember, 1975. 1 fig, 4 tab, 6 ref.

escriptors: *Irrigation effects, *Consumptive e, *Water requirements, *Soil moisture, oisture uptake, Soil types, *Wheat, Soil texe, Sands, Water utilization, Irrigation, Moisture ntent, Water loss, Moisture deficit, Evaporan, Growth stages, Crop production, Irrigation iciency, Evaporimeters.
entifiers: *Rajasthan, *India.

heat is one of the most important irrigated crops wn in the northwestern part of Rajasthan, dia. An experiment was conducted to determine consumptive use and soil moisture depletion ttern of Kalyan Sona wheat, a dwarf variety, in nt textured soils. Results indicate that over 60 rcent of the water consumed by the crop was tained from the upper 30 centimeters of soil er and less than 40 percent from the 30 to 60 ntimeters depth. The consumption below 60 ceneters soil depth was very little. The overall soil isture loss from different irrigation treatments given. These data indicate the increased water uirement with increase in age of the crop. Thus, stage of crop growth and the evaporative dend determined the loss of moisture from the l. Applying 40 to 50 millimeters of water after a mulative pan evaporation of 45 to 55 millimeters m standard U.S. Pan evaporimeter was found imum. The total number of irrigations thus uired were 8 to 10 with a total depth of 360 to millimeters. (Jamail-Arizona)
77-02860

ANOMALOUS WATER RELATIONS IN COPPER-DEFICIENT WHEAT PLANTS,
Waite Agricultural Research Inst., Glen Osmond (Australia). Dept. of Agronomy.
For primary bibliographic entry see Field 2I.
W77-02861

AUTOMATED CONTROL OF TRICKLE IRRIGATION IN CITRUS,
Arizona Univ., Tucson. Dept. of Soils, Water, and Engineering.
J. D. Busman.
Master of Science Thesis, 1976. 82 p, 6 fig, 2 tab, 13 ref, 3 append.

Descriptors: *Irrigation systems, *Irrigation practices, *Irrigation efficiency, *Irrigation effects, *Citrus fruits, Oranges, Irrigation, Consumptive use, Agriculture, Fruit crops, Soil moisture, Moisture tension, Evaporation pans, Nuclear moisture meters, Irrigation water, Tensiometers, Arizona, Mathematical models.
Identifiers: *Automatic control, *Trickle irrigation.

In recent years the level of interest in trickle irrigation has increased significantly and much work has been done in the design of trickle systems for use in citrus irrigation. This study evaluates an automatic control system, constructed using digital logic, designed to regulate trickle irrigation. The system used an instrumented evaporation pan and an instrumented tensiometer as inputs to a controller. Evaporation from the pan was used to make an estimate of consumptive use of the citrus trees. When soil moisture tension was at the desired level, the controller would allow flow through the trickle system to satisfy this estimate. Soil moisture tensions above or below the desired level would result in irrigation above or below the consumptive use estimate respectively. The operation of the control system was tested in a plot of Valencia orange trees near Tacna, Arizona. The theory involved, the system design and construction, and its operation are evaluated. The data available show that the control system does perform as designed. (Jamail-Arizona)
W77-02864

TRICKLE-DRIP IRRIGATION: PRINCIPLES AND APPLICATION TO WATER MANAGEMENT IN TROPICAL SOILS,
Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
E. Bresler.
Agronomy Mimeo 75-14, July 1975. 81 p, 17 fig, 3 tab, 34 ref, append.

Descriptors: *Irrigation systems, *Water management(Applied), *Surface irrigation, *Irrigation efficiency, *Irrigation practices, Irrigation, Tropical regions, Crop production, Mathematical models, Salinity, Clogging, Soil water, Infiltration, Irrigation water, Agriculture, Irrigation design, Soil surfaces.
Identifiers: *Trickle-drip irrigation.

The use of trickling or dripping as a method of irrigating large fields has become quite common practice in agricultural production all over the world. The general principles of trickle irrigation are presented, its advantages and disadvantages evaluated, and its application to tropical soils discussed. The surface approach, as opposed to underground trickling (subsurface irrigation) was initiated in Israel and has been widely used for the past few years. This system with its high irrigation frequency increases crop yield, minimizes the salinity hazard to plants, allows continuous application of fertilizers and saves water. These advantages among others are discussed in detail. Some problems concerning the practical use of the method still exist. Operational difficulties of the trickling method may sometimes arise from the clogging of the drippers. Additional problems occur in arid regions where saline water must be used in that there is a tendency for salt to accumulate close to the wetted zone. A mathematical model is employed. (Jamail-Arizona)
W77-02868

CROP PRODUCTION IN THE ARID ZONE WITH SPECIAL REFERENCE TO WESTERN RAJASTHAN,
Central Arid Zone Research Inst., Jodhpur (India).
H. S. Mann, and R. P. Singh.
Annals of Arid Zone, Vol 14, No 4, p 347-357, December, 1975. 9 tab.

Descriptors: *Crop production, *Agronomic crops, *Irrigation canals, *Arid lands, Oilseed crops, Rice, Fertilizers, Irrigation, Planting management, Agriculture, Crops, Wells, Water sources, Land use, Irrigation water, Water conveyance, Soil management, Land management.
Identifiers: Rajasthan, *India.

The arid regions of India comprise a sizeable portion of the total geographical area of the country and contain concentrations of population. Agriculture in these arid regions is considered a necessary, but risky, undertaking. The crop production potentialities of arid lands in the state of Rajasthan are examined, and the types of crops under cultivation are discussed. Rice is one of the major crops of the state, much of it coming from the arid zones, oilseeds are a second major crop grown in the arid regions. Irrigation plays a vital role in the state's agricultural production. In Rajasthan, wells are the major source of irrigation water, followed by canals and tanks. With the completion of the Rajasthan Canal Project in the near future, the contributions of the arid regions will be significantly increased. The use of fertilizers in the area is also discussed. Enormous potential exists for the arid lands of Rajasthan and can be best exploited through proper soil and crop management. (Jamail-Arizona)
W77-02869

THE PRODUCTIVENESS OF LOESS SOILS OF DIFFERENT DEGREES OF EROSION, (IN GERMAN),
Giessen Univ. (West Germany).
T. Harrach.
Land-Wirtsch Forsch 28(3), p 190-199, 1975.

Descriptors: *Loess, *Crop production, *Crop response, *Nutrient requirements, *Soil-water-plant relationships, *Gray-brown podzolic soils, Soil erosion, Water requirements, Land use, Cultivated lands, Soil groups, Soil types, Podzols.
Identifiers: West Germany, Hesse, Pararendzinas, Kolluvisols.

In the loess areas of Hesse (West Germany) the cropyield on Gray Brown Podzolic soils, Pararendzinas and Kolluvisols is characterized by great deviation but there were no definite differences among 4 soils examined. The potential productivity of all 4 soils is very high. A great number of the eroded loess soils - especially Pararendzinas - are so poor in nutrients that the plants show excessively high consumption of water and low yield. Other reasons for the deviations in crop yield on similar soils are the land use system and the climate. The physical and biological condition of the cultivated soil seems to determine crop yield, especially of the Gray Brown Podzolic soil and partly of the Kolluvisols. The valuation of loess soils of different degrees of erosion in the 'Reichsbodenschatzung' (German Valuation of Soils) is also discussed and the importance of soil conservation is pointed out.--Copyright 1976, Biological Abstracts, Inc.
W77-02891

METABOLISM OF PROTEIN AND NUCLEIC ACIDS DURING ADAPTATION TO VARIOUS TYPES OF DROUGHT, (IN RUSSIAN),
Vsesoyuznyi Institut Rastenievodstva, Leningrad (USSR).
N. N. Kozhushko, and G. V. Udovenko.

U. OF I. URBANA-CHAMPAIGN

Fiziol Rast (Mosc) 22(6), p 1239-1244, 1975.

Descriptors: *Droughts, *Metabolism, *Drought tolerance, *Proteins, *Wheat, *Drought resistance, Fertilization.
Identifiers: *Nucleic-Acids.

The content of nucleic acids and protein in the leaves of wheat characterized drought resistance of the variety only in the course of restoration of the normal state of plants after drought and when there were favorable conditions for the adaptation of plants to drought. The degree of disturbance of the reproductive process under the conditions of drought, which was manifested as incompletely fertilized ear, supposedly depended on the degree of deviation of the dynamic equilibrium and metabolism from the normal state rather than on a degree in the content of nucleic acids and protein.--Copyright 1976, Biological Abstracts, Inc.
W77-02926

THE AERATION CONDITIONS OF SOUTHERN AND CISCAUCASIAN CHERNOZEMS UNDER IRRIGATION, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of General Soil Sciences.
For primary bibliographic entry see Field 2G.
W77-02927

DETERMINATION OF THE CRITICAL DEPTH FOR BAGAEVSKO-SADKI IRRIGATION SYSTEM, (IN RUSSIAN),
Moscow State Univ. (USSR). General Soil Sciences
E. G. Morgun.
Vestn Mosk Univ. Ser VI Biol Pochvoved 30(5), p 117-119, 1975.

Descriptors: *Irrigation systems, *Depth, Drainage, *Soils, Methodology.
Identifiers: *Bagaevsko-Sadki(USSR), Russian-Sfsr, USSR.

The critical depth was found by the method suggested by Sabolch. This method was effective for the evaluation of the critical depth and distinguishing the soil plots with different meliorative conditions (Russian SFSR, USSR). The relation between the critical depth and disposition of the irrigation and drainage system was investigated.--Copyright 1976, Biological Abstracts, Inc.
W77-02928

PHYSICAL AND CHEMICAL PROPERTIES OF TAKYR SOILS AND CHANGES IN THEIR AGROCHEMICAL PROPERTIES AFTER IRRIGATION, (IN RUSSIAN),
A. Gaipova, O. Eshchekov, and L. Orazova.
Probl Osvo Pustyn' 6, p 21-27, 1975.

Descriptors: Soils, *Irrigation, *Soil physical properties, *Soil chemical properties, Carbonates, Gypsum, Salts, Fertilization, *Fertilizers.
Identifiers: *Takyr soils, USSR.

The pre- and post-irrigational (12-yr) irrigation) agrochemical features of the takyr soils in the Tedzhen oasis (USSR) were studied. An attempt was also made to determine the optimum rate of fertilization. Long-term irrigation and application of mineral fertilizers influence the most mobile soil components -readily soluble salts, gypsum and, to a lesser degree, carbonates.--Copyright 1976, Biological Abstracts, Inc.
W77-02929

ANNUAL DYNAMICS OF SOLUBLE SALTS IN THE SOILS OF AN IRRIGATED FIELD WITH BOTH DEEP CLOSED AND OPEN DRAINAGE AT THE BAGAEVSKO-SADKOVSKAYA IRRIGATION SYSTEM, (IN RUSSIAN),
Moscow State Univ. (USSR). General Soil Sciences.
E. G. Morgun.
Vestn Mosk Univ. Ser VI Biol Pochvoved 30(4), p 102-105, 1975.

Descriptors: *Irrigation systems, *Annual, *Salts, *Soils, Drainage.
Identifiers: USSR, Bagaevsko-sadkovskaya(USSR).

Water and salt regimes of irrigated Caucasus chernozems (Russian SFSR, USSR) under deep drainage were investigated. A 3-m layer of the aerated zone is an active zone of vertical migration of water and soluble salts. An accumulation of soluble salts in winter was noted. In later periods a reduction of salt content in the upper meter with a simultaneous increase of salts in the lower layers took place. The source of the soluble salts is the lower layers of the aerated zone and ground waters.--Copyright 1976, Biological Abstracts, Inc.
W77-02930

AN APPRAISAL OF GROUND WATER FOR IRRIGATION IN THE APPLETON AREA, WEST-CENTRAL MINNESOTA,
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-02982

THE GROWTH AND YIELD OF POPLAR CULTURES UNDER WATERING AND FERTILIZATION CONDITIONS, (IN BULGARIAN),
Research Station of Rapid-Growth Tree Species, Svistov (Bulgaria).
D. A. Denev.
Gorsko Stop Nauka. 11(5), p 53-62, 1974.

Descriptors: *Growth rates, *Deciduous trees, *Trees, *Water requirements, *Fertilization, *Irrigation effects, Height, Cultures, Nitrogen, Phosphorus, Drainage effects, Drainage area, Groundwater availability, Nutrients, Soil moisture, Soil-water-plant relationships, Fertilizers.
Identifiers: *Poplars, Populus euramericana, Wood mass, Basal area, *Danube River basin.

The growth of poplars on drained land along the Danube River was suboptimal due to drought and low subterranean water supply during the vegetation period and the limited soil nutrient supply. Populus euramericana cv. Vernirubens were given NPK, N-P, PK mixtures under natural soil moisture conditions; some were irrigated with 200 mm water in 3 yr. Fertilization alone had a limited effect but NPK fertilization with irrigation increased the basal area by 22.10%, height by 17.85% and wood mass by 47.20%. Results obtained with nitrogen and phosphorus individually with irrigation were almost identical and this method is recommended.--Copyright 1975, Biological Abstracts, Inc.
W77-03040

CALCULATION OF RATE OF NUTRIENT UPTAKE BY GROWING ROOTS,
National Fertilizer Development Center, Muscle Shoals, Ala.
For primary bibliographic entry see Field 2I.
W77-03061

FIELD CHANNELS: A KEY TO BETTER INDIAN IRRIGATION,
Minnesota Univ., St. Paul. Dept. of Agricultural and Applied Economics.
K. W. Easter.
Water Resources Research, Vol. 11, No. 3, p 389-392, June 1975. 3 tab, 8 ref.

Descriptors: Irrigation, Irrigation effects, Surface irrigation, Flood irrigation, Irrigation systems, *Irrigation canals.
Identifiers: *India, *Field channels(Irrigation).

Two different programs which attempted to improve water use and management were evaluated in eastern India. The improvement was through the installation of field channels in existing flood irrigation projects. The channels gave farmers better control over water on each field. The analysis highlights the importance of technically trained people and low-cost project designs in making projects viable. Annual net returns of 300-350 rupees per acre were obtained in the Sambalpur villages with investment costs of only 34 rupees per acre. The contrasting pilot project in Raipur had a much lower profit potential due to high investment costs. The analysis adds support to the proposition that India should spend more public funds on modest improvements in existing flood irrigation systems and much less on large new irrigation projects. (Skogerboe-Colo St)
W77-03062

EFFECT OF METHOD OF NITROGEN APPLICATION ON CORN (ZEA MAYS L.) GROWN ON IRRIGATED SANDY SOIL,
Nebraska Univ., Concord. Northeast Station.
G. W. Rehm, and R. A. Wiese.
Soil Science Society of America Proceedings, Vol 39, No. 6, p 1217-1220, November-December 1975. 1 fig, 2 tab, 10 ref.

Descriptors: *Nitrogen, *Nutrients, *Fertilizers, Fertilization, *Corn(Field), Crop response, Irrigation, Leaching, Sands.
Identifiers: *Sandy soils.

Studies were conducted in 1970 and 1972 to determine the influence of method of nitrogen application on corn production on irrigated, sandy soils. Conventional preplant and sidedress treatments were compared to situations where either preplant or sidedress applications were supplemented with added N in the irrigation water. Grain yields were recorded and the NO3(-)-N distribution to 150 cm in the soil profile was measured at the end of the growing season. The influence of method of application on corn yields was related to the texture profile of the soil. For a sandy soil with no accumulation of fine textured material, the application of N with the irrigation water increased grain yields. Also, the corn crop recovered a higher proportion of the applied N when some fertilizer was added with the irrigation water. For a soil type characterized by an accumulation of fine textured material at 50-70 cm below the surface, method of N application had no influence on yield since the downward movement and loss of NO3(-)-N was restricted by the layer of fine-textured material. The data show that the application of a portion of the N fertilizer requirement with the irrigation water should be a recommended practice for corn production on sandy soils having no accumulation of fine-textured material. (Skogerboe-Colo St)
W77-03071

FERTILIZER OR SALT LEACHING AS AFFECTED BY SURFACE SHAPING AND PLACEMENT OF FERTILIZER AND IRRIGATION WATER,
Colorado State Univ., Fort Collins. Dept. Agricultural Engineering.
W. D. Kemper, J. Olsen, and A. Hodgdon.
Soil Science Society of America Proceedings, Vol 39, No. 1, p 115-119, January-February, 1975. 1 fig, 9 ref.

Descriptors: *Irrigation water, *Furrow irrigation, *Surface irrigation, Fertilization, *Leaching, Root zone, Irrigation effects, Return flow, *Fertilizers, Salts.
Identifiers: *Fertilizer placement.

Irrigation in furrows and placement of fertilizer bands in ridges was evaluated as a means for allowing overirrigation to bypass nitrate and reduce leaching losses. In a loamy sand, placement in a band 0 to 5 cm higher than the surface of water in the furrow allowed over 120 cm of overirrigati

efore the salt began to leave the root zone. In the lay loam a similar delay of nitrate removal was ot achieved until the band was 10 cm higher than ne water surface. This difference appeared to be ssociated with a perched water table that eveloped in the 'cultivated' layer of the clay loam oil due to higher hydraulic conductivity in cul-vated than in the lower soil. Downward move-ent of relatively concentrated salt solution near ne band, due to its greater density, was a factor at allowed fertilizer bands at lower levels to nter the mainstream of the leaching water. Skogerboe-Colo St)
/77-03072

IELD RESPONSE OF ALFALFA CULTIVARS ND CLONES TO SEVERAL PH LEVELS IN ATUM SUBSOIL,
irginia Polytechnic Inst. and State Univ., lacksburg. Dept. of Agronomy.
. R. Buss, J. A. Lutz, Jr, and G. W. Hawkins.
gronomy Journal, Vol. 67, No. 3, p 331-334, lay-June 1975. 5 tab, 8 ref.

escriptors: *Aluminum, *Alfalfa, *Crop esponse, Subsoils, Soil investigations, Soil tests, Hydrogen ion concentration.
dentifiers: *Clones, Tatum subsoils.

reeding for increased tolerance to high aluminum w pH soils should enlarge the range of adapta-on of alfalfa. This research was undertaken to btain information on the range of genetic varia-on present in alfalfa cultivars for reaction to soil H in a high aluminum soil. Eighteen alfalfa cul-vars were planted in unlimed (pH 4.4) and limed pH 6.0) Tatum subsoil. None survived in the un-med soil and all grew in the limed soil. Clones ere selected for root development in unlimed soil fter growing down through a 5 cm layer of limed oil. When grown at pH levels of 5.3, 6.1, and 7.5, ey showed a highly significant clone X pH in-raction for yield. However, on the average they d not seem much more acid tolerant than un-elected clones. This screening technique was mewhat successful in isolating acid tolerant ones, but forage yield at low pH appeared to be a etter criterion. Results indicate that alfalfa cul-vars exhibit a narrower range of acid tolerance an is known to exist in several other crop spe-es, but that individual clones differ in their reac-on to both low and high soil pH. It was concluded at sufficient genetic variation exists to permit lection for tolerance to low pH, but the narrow netic base might limit progress. Also the overall laptation of selected populations might be mewhat unpredictable because of the clone to H interaction.
77-03075

WATER QUANTITY MANAGEMENT AND CONTROL

A. Control Of Water On The Surface

ROCEEDINGS OF SEMINAR SESSIONS ON TATE WATER SUPPLY PLANNING, SEPT. - CT. 1975, (EXECUTIVE SUMMARY).
assachusetts Univ., Amherst. Water Resources search Center.
r primary bibliographic entry see Field 6B.
77-02618

ROCEEDINGS OF SEMINAR SESSIONS ON TATE WATER SUPPLY PLANNING (SEPT.-CT. 1975).
assachusetts Univ., Amherst. Water Resources search Center.
r primary bibliographic entry see Field 6B.
77-02619

LAKE ST. CLAIR BEGINNING-OF-MONTH WATER LEVELS AND MONTHLY RATES OF CHANGE OF STORAGE,
National Oceanic and Atmospheric Administration, Ann Arbor, Mich. Great Lakes Environmental Research Lab.
For primary bibliographic entry see Field 2H.
W77-02675

EFFECT OF STORAGE ON STORM AND COMBINED SEWERS,
Toronto Univ. (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W77-02746

EFFECTS OF SOIL CONSERVATION TREATMENT ON RUNOFF AND SEDIMENT LOSS FROM A CATCHMENT IN SOUTHWESTERN NEW SOUTH WALES, AUSTRALIA,
Soil Conservation Service of New South Wales, Sydney (Australia). Wagga Research Station.
For primary bibliographic entry see Field 4D.
W77-02772

OPTIMAL RAINGAGE DENSITIES AND ACCUMULATION TIMES: A DECISION-MAKING PROCEDURE,
Oklahoma Univ., Norman. Dept. of Meteorology.
For primary bibliographic entry see Field 2B.
W77-02798

HYDRODYNAMICS-DISPERSION STUDIES IN STORM SEWERS,
Rutgers - The State Univ., New Brunswick, N. J. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 8B.
W77-02827

ENVIRONMENTAL EVALUATION OF WATER RESOURCES DEVELOPMENT,
Texas A and M Univ., College Station. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 6G.
W77-02828

THE EFFECTS ON AGRICULTURE IN UTAH OF WATER TRANSFERS TO OIL SHALE DEVELOPMENT,
Utah State Univ., Logan. Dept. of Economics.
For primary bibliographic entry see Field 6D.
W77-02829

OPTIMIZATION OF WATER RESOURCE SYSTEMS INCORPORATING EARTHQUAKE RISK,
California Univ., Los Angeles. School of Engineering and Applied Science.
For primary bibliographic entry see Field 6A.
W77-02831

WATER QUALITY EFFECT OF DIKING A SHALLOW ARID-REGION LAKE,
Brigham Young Univ., Provo, Utah.
For primary bibliographic entry see Field 5C.
W77-02871

EFFECTS OF TREE GROWTH NEAR SMALL WATERWAYS OF MUENSTER ON VEGETATION IN WATER AND ON SLOPES WITH RESPECT TO MAINTENANCE OF THOSE WATERWAYS, (IN GERMAN),
Bundesanstalt fuer Vegetationskunde, Naturschutz und Landschaftspflege, Bonn-Bad Godesberg (West Germany).
W. Lohmeyer, and A. Krause.
Schriftenr Vegetationskd. 9, p 1-106, 1975.

Descriptors: *Trees, *Plant growth, *Channels, *Grassed waterways, *Streams, *Riparian plants, *Slopes, *Vegetation effects, Maintenance, Inland waterways, Eutrophication, Erosion, Muskrats, Slope stabilization.
Identifiers: Alnus glutinosa, Muenster, West Germany, Westphalia, Ruderal herbs, Alders, Mowing.

Studies were carried out on 200 sections of representative creeks and ditches in north-western Westphalia (Munsterland) (West Germany) to determine how the existence or absence of riparian tree rows affected plant growth in the waterway's profile. Dense shade from the trees surpresses all aquatic and amphibious plant growth. However, full sunlight together with heavy eutrophication produces weed growth below the waterline and dense growth of ruderal herbs on the slopes. The use of mechanical mowers on the waterway's slopes is limited because they initiate erosion and destruction by muskrats. The base of the slopes is only stabilized by deeply rooted alders (Alnus glutinosa), which also prevent abundant growth of grass and herbs in the profile by their dense shade.--Copyright 1975, Biological Abstracts, Inc.
W77-02887

STUDY OF SANITARY PROBLEMS IN CONNECTION WITH INTER-BASIN TRANSFER OF RIVER RUNOFF, (IN RUSSIAN),
Nauchno-Issledovatelskii Institut Gigieny, Moscow (USSR).
For primary bibliographic entry see Field 5C.
W77-02905

THE EFFECT OF STAND STRUCTURE ON WATER REGIME OF MOUNTAIN SOILS OF THE CARPATHIANS, (IN RUSSIAN),
All-Union Research Inst. of Soil Erosion Control, Kursk (USSR).
V. N. D'yakov.
Lesovedenie 1, p 11-17, 1976.

Descriptors: *Soil physical properties, *Soil water, Spruce, Soil moisture, Fir trees, Precipitation(Atmospheric), Flow.
Identifiers: Beech, *Carpathians region(USSR), Mountain soils.

Thirty year old beech and beech-spruce stands (in the USSR) are characterized by more favorable soil water and physical properties than spruce monocultures. For 4 hydrological years 83.5% of the precipitation fell in the beech forest; in spruce-beech, 75.2%; and in spruce, 54.8%, with respect to glades. The same tendency is characteristic of soil moistening. The greatest spring surface flow is off the glades and in the spruce stand, the smallest in spruce-beech and fir-beech forests. The surface flow is marked in heavy showers (daily intensity 100-140 mm) in spruce plantations, less in spruce-fir stands.--Copyright 1976, Biological Abstracts, Inc.
W77-02923

EFFECTS OF FLOOD FLOWS ON WATER QUALITY OF TIOGA-HAMMOND LAKES; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 5B.
W77-02931

HYDRAULIC CHARACTERISTICS OF RIGOLETS PASS, LOUISIANA, HURRICANE SURGE CONTROL STRUCTURES; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02932

U. S. D. A. - URBANA-CHAMPAIGN

Field 4—WATER QUANTITY MANAGEMENT AND CONTROL

Group 4A—Control Of Water On The Surface

TECHNIQUES FOR REDUCING TURBIDITY ASSOCIATED WITH PRESENT DREDGING PROCEDURES AND OPERATIONS,
Huston (John), Inc., Corpus Christi, Tex.
For primary bibliographic entry see Field 5G.
W77-02936

DEVELOPMENT OF NAVIGATION WITH LOCKS AND DAMS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02943

DESIGN FOR WAVE PROTECTION, FLOOD CONTROL, AND PREVENTION OF SHOALING, CATTARAUGUS CREEK HARBOR, NEW YORK; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02952

TIOGA OUTLET WORKS, TIOGA AND HAMMOND LAKES, SUSQUEHANNA RIVER BASIN, PENNSYLVANIA; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02956

WATER QUANTITY REQUIREMENTS FOR PUBLIC SUPPLIES AND OTHER USES,
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 6D.
W77-02969

PRELIMINARY RESULTS OF PREIMPOUNDMENT WATER-QUALITY STUDIES IN THE TIOGA RIVER BASIN, PENNSYLVANIA AND NEW YORK,
Geological Survey, Harrisburg, Pa. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-02977

MAPPING AND MEASURING LAND-COVER CHARACTERISTICS OF NEW RIVER BASIN, TENNESSEE, USING LANDSAT DIGITAL TAPES,
Geological Survey, Nashville, Tenn. Water Resources Div.
E. F. Hollyday, and S. P. Sauer.
Water-Resources Investigations 76-106 (open-file report), September 1976. 14 p, 13 fig, 1 tab, 3 ref.

Descriptors: *Land use, *Maps, *Remote sensing, *Satellites(Artificial), *Terrain analysis, Distribution patterns, Strip mines, Coal mines, Land classification, Watersheds(Basins), Sediments, Forests, Data processing, Aerial photography, *Tennessee.
Identifiers: *Cumberland Plateau(Tenn), *Landsat digital tapes.

Land-cover information is needed to select subbasins within the New River basin, Tennessee, for the study of hydrologic processes and is also needed to transfer study results to other sites affected by coal mining. This study demonstrates that digital processing of Landsat tapes can produce maps and tables of the areal extent of selected land-cover categories. The relative area of each category within the basin is agriculture, 5 percent; evergreens, 7 percent; bare earth, 6 percent; three categories of hardwoods, 81 percent; and water, rock, and uncategorized areas, each less than 1 percent. (Woodard-USGS)
W77-02978

SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70: PART 1. NORTH ATLANTIC SLOPE BASINS--VOLUME 2. BASINS FROM NEW YORK TO DELAWARE.
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-02980

SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70: PART 11. PACIFIC SLOPE BASINS IN CALIFORNIA--VOLUME 3. SOUTHERN CENTRAL VALLEY BASINS.
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-02981

DISCHARGE COMPUTATIONS AT RIVER CONTROL STRUCTURES,
Geological Survey, Jackson, Miss. Water Resources Div.
D. L. Collins.
Proceedings of ASCE, Journal of the Hydraulics Division, Vol 102, No HY7, Paper 12237, p 845-863, July 1976. 10 fig, 5 tab, 3 ref, append.

Descriptors: *Streamflow, *Flow control, *Hydraulic structures, *Flow rates, *Computer programs, Analytical techniques, Dams, Gates, Locks, Spillways, Turbines, Stream gages.
Identifiers: *Streamflow computations, Calibration techniques.

A procedure has been developed by the U.S. Geological Survey to calibrate regulating control structures and determine continuous records of stream-flow on highly-regulated rivers. The hydraulic theory assumes steady unform flow within a computational interval, usually 1 hr. Five different types of control have been analyzed, including tainter gates, turbine wicket gates, fixed or emergency spillways, locks, and crest gates. Field variables recorded include headwater stage, tailwater stage, gate positions, turbine scroll case pressure drops, number of lockages, and number of crest gates open. Instrumentation was developed for monitoring the necessary variables. A generalized software package has been developed to compute the continuous streamflow records at these multipurpose structures by utilizing calibration results and in-situ variables recorded by digital recorders. Two typical calibration procedures showing the general accuracy of the computational methods are presented. (Woodard-USGS)
W77-02986

CONVECTIVE MODEL OF LONGITUDINAL DISPERSION,
Geological Survey, Jackson, Miss. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-02988

DISPERSION--MISSISSIPPI RIVER BELOW BATON ROUGE, LA.,
Geological Survey, Jackson, Miss. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-02989

INDEX TO WATER RESOURCES DATA FOR ILLINOIS,
Geological Survey, Champaign, Ill. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-02990

WATER RESOURCES ADMINISTRATION IN VIRGINIA: ANALYSIS AND EVALUATION,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Water Resources Research Center.
For primary bibliographic entry see Field 6B.
W77-02996

THE EFFECT OF RIVER FLUCTUATIONS RESULTING FROM HYDROELECTRIC PEAKING ON SELECTED AQUATIC INVERTEBRATES AND FISH,
Idaho Univ., Moscow. Water Resources Research Inst.
For primary bibliographic entry see Field 5G.
W77-03000

HYDRAULIC SIMULATION USING DISTRIBUTED PARAMETERS,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2A.
W77-03001

WATER HYACINTHS FOR REMOVAL OF CADMIUM AND NICKEL FROM POLLUTED WATERS,
National Space Technology Labs., Bay St. Louis, Miss.
For primary bibliographic entry see Field 5G.
W77-03041

4B. Groundwater Management

GROUNDWATER POLLUTION BY WOOD WASTE DISPOSAL,
Oregon State Dept. of Environmental Quality, Salem.
For primary bibliographic entry see Field 5B.
W77-02591

IMPROVING DESIGN CRITERIA FOR SEPTIC TANK SYSTEMS,
Arkansas Univ., Fayetteville. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W77-02621

SUMMARY OF GROUND-WATER QUALITY IMPACTS OF URANIUM MINING AND MILLING IN THE GRANTS MINERAL BELT, NEW MEXICO,
Office of Radiation Programs, Las Vegas, Nev.
For primary bibliographic entry see Field 5B.
W77-02648

HEAT AND MASS TRANSFER IN MODELS OF UNDEVELOPED GEOTHERMAL FIELDS,
Colorado Univ., Boulder. Dept. of Engineering.
D. R. Kassoy.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-247 12
Price codes: A03 in paper copy, A01 in microfich
Report NSF-RA-N-75-120, June 16, 1975. 26 p, fig, 1 tab, 9 ref. NSF AER74-03429, NSF G 44212.

Descriptors: *Geothermal studies, *Model studies, *Heat transfer, *Mass transfer, Convection, Fluid mechanics, Energy transfer, Thermal water, Groundwater, Aquifers, Mathematical models, Viscosity, Temperature, Heat flow, Geophysics.
Identifiers: *Geothermal fields.

A brief summary was given of the nondimensional equations and relevant parameters to be used for describing convection processes in the geothermal setting. Characteristic estimates of flow rates and pressure variation (beyond the hydrostatic value) were given. It was shown that the complete equation system can be reduced in complexity by neglecting terms which describe physically insignificant effects. The resulting equations were used to consider the onset of convection in a horizontal saturated porous slab when a realistic model

cosity variation was used. It was shown that the ssical constant viscosity prediction is in error h quantitatively and qualitatively. A calculation s made for the rate of convective upflow in a del fault zone. It was shown that under ap-opriate conditions it is possible to transport as ch as 2 - 3 million kg/day up a fault system with orizontal cross-sectional area of only 0.3 sq km. ms-ISWS)
7-02805

ATER UNDER THE SAND,
Muller.
w Scientist, Vol. 71, No. 1020, p 702-703, Sep-ber 30, 1976.

scriptors: *Sandstones, *Sand aquifers, quifers, *Subsurface waters, *Groundwater ources, Aquifer management, Underground rage, Water sources, Saline water intrusion, esian wells, Deserts, Water management, ter resources development, Seepage, Dams, ers, Crop production, Irrigation.
ntifiers: *Nubian sandstone.

surface water in the Nile River Valley is a ential water resource, the prospects and blems of its utilization are discussed. Poor inage is a major problem: without proper nage much of the newly irrigated land will be productive. Increased seepage losses from canal fields into the subsoil have exceeded the rate which water can drain to the underlying gravels. e rising water table has brought with it problems increased saline water intrusion. Tile drainage tems being constructed should cope with the eat posed by shallow ground waters. A major rce of subsurface water are the Nubian sand-ne aquifers which contain 6000 billion cubic ters of water. The question of whether these ters should be mined is discussed. One proposal or the creation of a 'New Valley' in the Lybian ert west of the Nile River to link a series of pressions in which artesian springs once flowed m the exposed sandstone aquifer. Studies are ng conducted in Egypt to evaluate these pro-ts. At present Egypt has decided to invest ources in drainage projects and small scale in-tigations of the Nubian sandstones rather than onumental water project. (Jamail-Arizona)
7-02852

ITE-STATE MODELS OF TRANSPORT ENOMENA IN HYDROLOGIC SYSTEMS,
zona Univ., Dept. of Hydrology and Water ources.
primary bibliographic entry see Field 2F.
7-02865

CORDS OF WELLS AND WATER QUALITY R THE GARBER-WELLINGTON AQUIFER, RTHERN OKLAHOMA AND SOUTHERN GAN COUNTIES, OKLAHOMA,
ological Survey, Oklahoma City, Okla. Water ources Div.
. Carr, and J. S. Havens.
ological Survey open-file report 76-619, Sep-ber 1976. 32 p, 2 tab, 4 ref.

criptors: *Water wells, *Well data, *Water ls, *Water quality, *Oklahoma, Data collec-s, Water yield, Aquifers, Water users, Chemi-analysis.
ntifiers: Northern Oklahoma County(Okla), thern Logan County(Okla), Garber-Wellington ifer.

lished and unpublished records are presented approximately 425 wells in southern Logan and thern Oklahoma counties, Oklahoma. In addi-, water-quality data for 72 wells are tabulated, 4 references to pertinent ground-water reports ering parts of the area are included. (Woodard-GS)
7-02974

AN APPRAISAL OF GROUND WATER FOR IRRIGATION IN THE APPLETON AREA, WEST-CENTRAL MINNESOTA,
Geological Survey, Reston, Va. Water Resources Div.
S. P. Larson.
Available from Supt. of Documents, GPO, Wash., D.C. 20402, price $2.60. Water-Supply Paper 2039-B, 1976. 34 p, 14 fig, 3 plates, 4 tab, 17 ref.

Descriptors: *Groundwater resources, *Supplemental irrigation, *Water yield, *Water quality, *Aquifer characteristics, Model studies, Mathematical models, Pumping, Drawdown, Groundwater recharge, Streamflow, Base flow, Diversion, *Minnesota.
Identifiers: West-Central Minnesota.

Supplemental irrigation of well-drained sandy soils has prompted an evaluation of ground water in the Appleton area in Minnesota. Glacial drift aquifers are the largest source of ground water. The surficial outwash sand and gravel is the most readily available and the most areally extensive drift aquifer, and it underlies much of the sandy soil area. Saturated thickness of the outwash is more than 80 feet in places, and potential well yields may exceed 1,200 gal/min in some areas. In about 17 percent of the area, yields of more than 300 gal/min are obtainable. Recharge to the outwash aquifer occurs primarily during the spring thaw and averages about 5 inches annually. Most discharge from the aquifer appears as base flow in the Pomme de Terre River. Despite dissolved-solids concentrations ranging from 280 to 1,350 mg/liter, the water is chemically suitable for irrigation. Mathematical models of a part of the aquifer were made to evaluate the effects of 20 successive years of ground-water withdrawal for three irrigation-development patterns. It was estimated that the present annual withdrawal rate of 1,410 acre-ft would result in water-level declines of less than 3 feet. However, annual withdrawals of 8,450 acre-ft would cause aquifer dewatering and decreased well yields in some places. After a new state of equilibrium was established in response to withdrawals, most of the withdrawal would be supplied by diverted base flow from the Pomme de Terre River. (Woodard-USGS)
W77-02982

WATERLOGGING IN AN ALLUVIAL AQUIFER NEAR LAKE MINNEQUA, PUEBLO, COLORADO,
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 2F.
W77-02983

WATER-RESOURCES DATA FOR DEEP AQUIFERS ON EASTERN MONTANA,
Geological Survey, Helena, Mont. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-02985

DIGITAL GROUND-WATER MODEL OF THE OGALLALA AQUIFER IN PARTS OF WASHINGTON AND YUMA COUNTIES, NORTHERN HIGH PLAINS OF COLORADO,
Geological Survey, Lakewood, Colo. Water Resources Div.
G. W. Kapple, R. R. Luckey, and W. E. Hofstra.
Colorado Water Conservation Board, Denver, Colorado Water Resources Circular No 34, 1976. 25 p, 15 fig, 15 ref.

Descriptors: *Groundwater mining, *Model studies, *Pumping, *Irrigation wells, *Drawdown, Forecasting, Digital computers, Mathematical models, Aquifer characteristics, Evaluation, *Computer models, *Colorado, Great Plains.
Identifiers: Northeastern Colorado, *Ogallala formation(Colo).

A finite-difference digital model was developed to simulate the effects of future pumping on a part of the Ogallala aquifer in the northern High Plains of Colorado. The model area covers 768 square miles (1,990 square kilometers) of Washington and Yuma Counties and is the fourth area to be modeled in the northern High Plains project. Ground water in this area is used principally for irrigation and about 215 large-capacity (greater than 100 gallons per minute or 6.3 liters per second) wells were installed through 1973. Calibration of the model was achieved by comparing observed and calculated water-level changes for 1964-73. The calibrated model was used to predict future declines based on extended 1973 pumpage and estimated future pumpages with the hypothetical addition of 107 and 199 wells between 1973-83. These predictions indicate that through the year 2000 saturated thickness would remain greater than 50 feet (15.2 meters) over most of the area. Maximum declines of from 55 to 85 feet (16.8 to 25.9 meters) would occur near Yuma. The model was most sensitive to variations in pumpage and specific yield and least sensitive to transmissivity. (Woodard-USGS)
W77-02991

MAJOR AQUIFERS IN HAND AND HYDE COUNTIES, SOUTH DAKOTA,
Geological Survey, Huron, S.D. Water Resources Div.
N. C. Koch.
South Dakota Geological Survey, Vermillion, Information Pamphlet No 14, 1976. 5 p.

Descriptors: *Groundwater resources, *Aquifer characteristics, *Water yield, *Water quality, *Water utilization, Water supply, Available water, *South Dakota.
Identifiers: Hand County(S Dak), Hyde County(S Dak).

This information pamphlet describes the general distribution, quantity, and quality of ground water available from the major aquifers in Hand and Hyde Counties, South Dakota. The data were collected by the U.S. Geological Survey and the South Dakota Geological Survey during the period of 1972-75. The Tulare aquifer underlies an area of about 950 sq mi in northern Hand and Hyde Counties. The aquifer may yield as much as 1,000 gpm of water to properly-constructed wells at depths ranging from 10 to 200 ft. Water in the Tulare aquifer is predominantly of calcium bicarbonate or sodium sulfate type with dissolved solids ranging from 200 to 1,800 mg/liter. Water in the Highmore aquifer is predominantly of calcium bicarbonate or sodium sulfate type with dissolved solids ranging from 500 to 2,000 mg/liter. The Highmore aquifer underlies an area of about 100 sq mi in central Hyde County. The aquifer may yield as much as 1,000 gpm of water to properly-constructed wells at depths ranging from 20 to 200 ft. The Elm Creek aquifer underlies an area of 30 sq mi in southwestern Hand County and southeastern Hyde County. The aquifer may yield as much as 1,000 gpm of water to properly-constructed wells at depths ranging 20 to 100 ft. Water in the Elm Creek aquifer is predominantly of calcium bicarbonate or calcium sulfate type with dissolved solids ranging from 500 to 1,000 mg/liter. It is of suitable quality for domestic, stock, municipal, and irrigation use. The Bad-Cheyenne River aquifer underlies an area of about 200 sq mi in Hyde and Hand Counties. The aquifer may yield as much as 1,000 gpm of water to properly-constructed wells at depths ranging mostly from 250 to 330 ft. Water in the Bad-Cheyenne aquifer is of the sodium bicarbonate type with dissolved solids ranging from 1,300 to 1,800 mg/liter. It is of suitable quality for stock and domestic uses. (Woodard-USGS)
W77-02992

U.S. DEPT. OF AGRICULTURE

4C. Effects On Water Of Man's Non-Water Activities

EFFECTS OF RECREATION ON WATER QUALITY IN WILDLANDS,
Colorado State Univ., Fort Collins, Colo. Dept. of Recreation Resources.
For primary bibliographic entry see Field 5C.
W77-02590

BISCAYNE BAY AND ITS ENVIRONS. AN ANALYSIS OF ITS PRESENT AND FUTURE USES FOR METROPOLITAN DADE COUNTY,
General Oceanics, Inc., Miami, Fla.
For primary bibliographic entry see Field 5G.
W77-02680

WINTER RUNOFF FROM AN URBAN CATCHMENT, (JANUARY TO MARCH 1974),
Nova Scotia Technical Coll., Halifax. Dept. of Civil Engineering.
D. H. Waller, and W. A. Coulter.
Canada-Ontario Agreement on the Great Lakes Water Quality, Research Report No. 41, Environmental Protection Service, Environment Canda, Ottawa, Canada, 1974, 50p., 1 app., 7 fig., 16 tab, 11 ref. 74-8-3.

Descriptors: *Snowmelt, *Urban runoff, Drainage water, Winter, Precipitation(Atmospheric), Dusts, Rainfall, Snow, Roads, Suspended solids, *Canada, Watersheds(Basins).
Identifiers: Halifax, Nova Scotia.

Information about winter runoff and snowmelt was obtained for a 163 acre combined sewer drainage area in Halifax, Nova Scotia, from January to March of 1974. Limited amounts of data were obtained for: precipitation; dustfall; snow quantity, quality and density; amount and composition of street solids accumulation and of sand used for ice control; composition of runoff due to snowmelt and rainfall; and, composition and flow rate of dry weather flow and combined sewage. The information obtained is discussed in terms of its application to development or testing of runoff quantity and quality models. (Environment Canada)
W77-02739

EFFECTS OF MAN ON THE INTERFACE OF THE HYDROLOGICAL CYCLE WITH THE PHYSICAL ENVIRONMENT.
For primary bibliographic entry see Field 4D.
W77-02771

EFFECTS OF PULPWOOD HARVESTING ON THE QUALITY OF STREAM WATERS OF FOREST CATCHMENTS REPRESENTING A LARGE AREA IN WESTERN ALBERTA, CANADA,
Northern Forest Research Center, Edmonton (Alberta).
For primary bibliographic entry see Field 5B.
W77-02774

NATURAL AND HUMAN INFLUENCE ON THE HYDROLOGICAL CYCLE IN SOUTH INDIA,
Osmania Univ., Hyderabad (India). Dept. of Geology.
For primary bibliographic entry see Field 4D.
W77-02777

MAN'S IMPACT ON EROSION IN THE RURAL ENVIRONMENT: THE INDIAN EXPERIENCE,
International Hydrological Decade, New Delhi (India). Indian National Committee.
V. B. Lal, and S. Banerji.
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No. 113, p 46-52, 1974. 1 fig, 3 tab, 13 ref.

Descriptors: *Erosion, *Rural areas, *Watersheds(Basins), Land use, Reservoirs, River systems, History, Planning, Land management, River basin development, Soil conservation.
Identifiers: *India.

Many large-scale engineering works have taken place in India since 1947. These include river valley projects, road networks in border areas, the construction of industrial complexes, and urban expansion. These projects have involved deforestation and an encroachment on the rural environment which have both affected the silt-flow regime in the rivers. In turn, this changed regime has affected canals and reservoirs and caused the meandering of river courses over tracts of land often as much as tens of kilometers wide. The paper gave a brief account of these problems in the Indian experience, and included examples of a few catchments of important river valley projects in India where soil conservation measures on a significant scale had been adopted. The reasons behind the adopted measures were discussed, and an assessment was given of their effectiveness in the short period since their implementation. (See also W77-02771) (Humphreys-ISWS)
W77-02778

EFFECTS OF MAN'S ACTIVITIES ON EROSION IN RURAL ENVIRONMENTS AND A FEASIBILITY STUDY FOR REHABILITATION,
Indonesia Univ., Djakarta. Faculty of Technology.
R. S. Partosedono.
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No. 113, p 53-56, 1974.

Descriptors: *Erosion, *Rural areas, *Watersheds(Basins), Land use, River systems, River basin development, Irrigation, Reservoirs, Planning, Rehabilitation, River basins.
Identifiers: *Indonesia, *River Cimanuk.

The catchment area of the River Cimanuk is about 3322 sq km, and the length of the River Cimanuk is 180 km. The average rainfall is 1740 mm, and the maximum discharge in the rainy season is about 1300 cu m/s while the minimum discharge is only 1.5 cu m/s in the dry season. The density of foresests in the area is only 21% which the beginning of the World War II decreased by 5%. Deafforestation caused many areas to be very badly eroded, so that excessive sedimentation occurred in the lower reaches and the delta of the River Cimanuk. Annual erosion is 5 mm, and observations of the River Ciluning in the years 1911-1912 and 1934-1935 indicated that an average of 2890 tons/sq km of fertile soil had been removed by flood water. Population increase in the catchment area is 2.3% per annum. Because agricultural productivity is decreasing, many difficulties have arisen including a decrease in the food supply. Hence, people who can no longer produce a living in the area are leaving the basin and moving to several towns in West Java, thereby creating urbanization problems. Processes of erosion and sedimentation as well as the formation of the delta on the shore of the River Cimanuk have made the maintenance of the irrigation system in the basin impossible. (See also W77-02771) (Humphreys-ISWS)
W77-02779

THE EFFECT OF AFFORESTATION ON EROSION PROCESSES AND SEDIMENT YIELD,
Institute of Hydrology, Wallingford (England).
R. B. Painter, K. Blyth, J. C. Mosedale, and M. Kelly.
In: Effects of Man on the Interface of t Hydrological Cycle with the Physical Envir ment; Proceedings of Paris Symposium, S tember 1974. International Association Hydrological Sciences Publication No 113, p 67, 1974. 3 fig, 2 tab, 6 ref

Descriptors: *Demonstration watershe *Erosion, *Sediment yield, Forest watershe Reforestation, Model studies, Sediment transp Small watersheds, Sediments, Measureme Bank erosion, Gully erosion, Roads, Forests, load, Suspended load.

The effect of coniferous afforestation on ero processes and sediment yield in upland area the United Kingdom is being studied in three perimental basins, one is rough pasture and u for sheep grazing, the second has recently b deep plowed and planted with mixed conif while the third is under mature coniferous for A proposed model of sediment processes given. Also, the measurements made of sedim yield, both suspended and bedload, and of ero from source areas, notably streambanks, gull forest roads, forest ditches, and local slips w described. Forest ditching has had an immed effect on sedimentation giving 1000-fold increa in both suspended sediment concentrations total yield, compared with the preditching si tion. Bedload measurements suggest that e after ditches mature, erosion on steeper sl produces substantial changes in the supply material. (See also W77-02771) (Humphr ISWS)
W77-02781

PREDICTION OF EROSION INTENSIFI TION BY MAN,
Gruzinskii Nauchno-Issledovatelskii Ins Gidrotekhniki i Meliboratsii, Tiflis (USSR)
Ts. E. Mirtskhoulava.
In: Effects of Man on the Interface of Hydrological Cycle with the Physical Envi ment; Proceedings of Paris Symposium, S tember 1974. International Association Hydrological Sciences Publication No 113, p 82, 1974. 2 tab, 5 ref

Descriptors: *Soil erosion, *Rural areas, *L use, Slopes, Watersheds(Basins), Forecast Vegetation effects, Sediment yield, Equati Agriculture, Accelerated erosion
Identifiers: *USSR.

The acceleration of erosion on slopes is norm intensified by man. The optimal planning agriculture and the rational design of reliable sures to prevent erosion require the amount of erosion to be predicted from basic causative tors. It was demonstrated that man's activities cupy an important place among these factors. paper dealt with a modification of the met suggested earlier by the author on the basis o vestigations carried out in the USA and the US This modification permits the effects agrotechnical methods and crop rotations t estimated. (See also W77-02771) (Humphr ISWS)
W77-02784

THE ROLE OF FOREST STANDS IN THE C TROL OF EROSION PROCESSES AND OT NEGATIVE NATURAL PHENOMENA,
For primary bibliographic entry see Field 4D.
W77-02785

PREDICTING SEDIMENT YIELD FREQUE FOR RURAL BASINS TO DETERMINE MA EFFECT ON LONG-TERM SEDIMENTATIO
Agricultural Research Service, Temple, Tex.
For primary bibliographic entry see Field 4D.
W77-02786

IL COVER GOVERNS SOIL LOSS ON ITED STATES CLAYPAN SOILS,
icultural Research Service, Columbia, Mo. rth Central Region Watershed Research ter.
primary bibliographic entry see Field 4D.
7-02787

SPENDED SEDIMENTS FROM URBAN VELOPMENT,
awa Univ. (Ontario). Dept. of Civil Engineer-

G. Warnock, and R. G. Lagoke.
Effects of Man on the Interface of the drological Cycle with the Physical Environ-t; Proceedings of Paris Symposium, Sep-ber 1974. International Association of drological Sciences Publication No. 113, p 117-, 1974. 2 fig, 1 tab, 7 ref.

criptors: *Soil erosion, *Cities, *Canada, *On- investigations, Suspended load, Runoff, cipitation(Atmospheric), Sediment yield, getation effects, Construction, Community elopment.
ntifiers: *River Ottawa(Canada).

an development is accompanied by construc- activity. The vegetative ground cover may be oved, and, as a result, the soil may be exposed rosion. Precipitation is an active agent of ero-, and it may cause increased erosion in areas er urban development. Some preliminary lts were given for research on the increase of pended sediments in streams draining lands on ch urban development is taking place. The ly was done in Quebec in the drainage basin of River Ottawa. It was found that suspended ment loads in two streams after storm cipitation are correlated to storm precipitation unts. One of the streams drains a rural area, other drains an area which is being developed; n of the streams drain approximately the same area and are near one another. The stream ning the developing area shows two-to-five es as large a suspended sediment load. Data n both stream showed correlation of pended sediment load with amount of storm cipitation with the data from the developing showing a considerably better correlation. also W77-02771) (Humphreys-ISWS)
7-02788

BANIZATION AND THE PROCESSES OF OSION AND SEDIMENTATION IN THE ER NILE,
Shams Univ., Cairo (Egypt). Dept. of En-ering.
M. Soliman.
Effects of Man on the Interface of the rological Cycle with the Physical Environ-t; Proceedings of Paris Symposium, Sep-ber 1974. International Association of rological Sciences Publication No. 113, p 123-1974. 2 fig, 3 ref.

criptors: *Urbanization, *Islands, *Rivers, limentation, Floods, Erosion, Degrada-(Slope), Stream stabilization, Dams, Stream ion, Meanders.
ntifiers: *Egypt, *River Nile, *Cario(Egypt).

processes of erosion and sedimentation were dynamic state along the River Nile and its l islands during flood times. However, after ling the High Dam of Aswan, the situation ged and these islands appeared to be in a sta-position. The following observations for the r Nile near Cairo were noted: (1) There was little change of water surface elevation after High Dam Construction. This may be due to backwater effect of the Delta Barrage some 25 north of Cairo, (2) The bed level increased tly in certain locations, (3) The cross-section es are more uniform within the straight reach the main island, and (4) The suspended sediment concentration is rather higher than expected but much less than that before construction of the dam. It was concluded that a few islands south of Cairo could be used for urban facilities after some river control work has taken place. (See also W77-02771) (Humphreys-ISWS)
W77-02789

INCREASE OF SEDIMENT TRANSPORT DUE TO LARGE-SCALE URBANIZATION,
National Research Centre for Disaster Prevention, Tokyo (Japan).
T. Kinosita, and Y. Yamazaki.
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No. 113, p 127-129, 1974. 1 tab, 1 ref.

Descriptors: *Urbanization, *Sediment yield, *Surveys, Land development, Suburban areas, Drainage systems, Ponds, Reservoir silting, Land use, Reservoirs, On-site investigations.
Identifiers: *Japan, *Tokyo.

New towns are now under development in the suburbs of Tokyo. Sediment transport due to large-scale urbanization was measured in flood-storage ponds during the period of land development. Average annual sediment transport to the flood-storage ponds from loam and sand layers due to land development construction was 10.4 mm/year per hectare of drainage area. After completion of the pavements, grass cover of the earth surface, and lining of ditches for drainage, the sediment yield tended to zero. (See also W77-02771) (Humphreys - ISWS)
W77-02790

EFFECT OF THE GROWTH OF THE WEST PART OF MEXICO CITY ON HYDRODYNAMIC PROCESSES (EFFET DE LA CROISSANCE DE LA PARTIE OUEST DE LA VILLE DE MEXICO SUR LES PROCESSUS HYDRODYNAMIQUES),
Universidad Nacional Autonoma de Mexico, Mexico City. Instituto de Geografia.
L. E. Maderey.
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No. 113, p 130-136, 1974. 7 fig, 1 tab, 4 ref.

Descriptors: *Suspended solids, *Rivers, *Watersheds(Basins), *Mexico, *Runoff, Precipitation(Atmospheric), Discharge(Water), Cities, Vegetation effects, Sediment yield, Rainfall, Hydrologic aspects, Urban runoff, Foreign countries, Land use.
Identifiers: *Mexico City.

There has been a surge in the growth of Mexico City in recent years. As a result, the population of the western part of the City is in danger from water runoff. This paper analyzed the principle hydrological phenomena that have had their equilibrium unbalanced during the period 1961-1971. Some relationships were established, trends were studied, and some deductions were made. In particular, it was concluded that there is little variation between precipitation and runoff and that the suspended sediment is real. Therefore, very careful planning of urban growth was recommended which should take into account the protective influence of vegetation. (See also W77-02771) (Humphreys - ISWS)
W77-02791

SUSPENDED SEDIMENT PRODUCTION AND BUILDING ACTIVITY IN A SMALL BRITISH BASIN,
Exeter Univ. (England). Dept. of Geography.
D. E. Walling.
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No. 113, p 137-144, 1974. 5 fig, 3 tab, 15 ref.

Descriptors: *Small watersheds, *Urbanization, *Sediment yield, *On-site investigations, Watersheds(Basins), Cities, Suspended load, Sediment discharge, Runoff, Hydrographs, Land development, Land use.
Identifiers: *United Kingdom, Sediment concentration.

A study is being carried out on the influence of building activity on suspended sediment production from a small basin on the margins of Exeter. Records from the period August 1968 to March 1971, when the basin was essentially undisturbed, were used to calibrate its response and to assess the changes that occurred during 1973 when 25% of its area was influenced by building activity. On average, sediment concentrations have increased 5 fold and sediment loads 5 to 10 fold. (See also W77-02771) (Humphreys - ISWS)
W77-02792

EFFECT OF LAND DEVELOPMENT ON SOIL EROSION AND SEDIMENT CONCENTRATION IN AN URBANIZING BASIN,
Parsons, Brinckerhoff, Quade and Douglas, Inc., New York.
C-N. Chen.
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No. 113, p 150-157, 1974. 4 fig, 2 tab, 9 ref.

Descriptors: *Urbanization, *Land development, *Sediment yield, *District of Columbia, *Maryland, Cities, Land use, Soil erosion, Construction, Watersheds(Basins), Sedimentation rates, Runoff, Sediment discharge.
Identifiers: Sediment concentration.

Based upon data collected from drainage basins in the metropolitan regions of Washington, D.C. and Baltimore, the soil erosion rates from construction sites and non-construction lands were determined. The gross soil erosion from an urbanizing basin, with various percentages of area undergoing construction, was then evaluated on the basis of the erosion rates from (1) non-construction lands, (2) construction sites without erosion control, and (3) construction sites with different levels of on-site control practices. With regard to sediment runoff in the stream, a functional relationship was established to correlate the sediment concentrations with (1) the soil erosion rates from construction sites, (2) the percentage of basin area undergoing construction, (3) the sediment delivery ratio of the basin, and (4) the direct runoff in the stream. The quantitative information established in this study provides a tool to assess the potential impact of both controlled and uncontrolled land development on soil erosion and sediment concentration in an urbanizing basin. Furthermore, the information can be used as a guide in setting criteria for erosion control practices in terms of soil-loss limits from construction sites and/or sediment concentrations in streams. (See also W77-02771) (Humphreys - ISWS)
W77-02793

A RECONNAISSANCE OF THE EFFECTS OF A FOREST FIRE ON WATER QUALITY IN KINGS CANYON NATIONAL PARK, CALIFORNIA,
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-02973

LAKE ERIE INTERNATIONAL JETPORT MODEL FEASIBILITY INVESTIGATION; APPLICATION OF THREE-DIMENSIONAL HYDRODYNAMIC MODEL TO STUDY EFFECTS OF PROPOSED JETPORT ISLAND ON THERMOCLINE STRUCTURE IN LAKE ERIE,
Case Western Reserve Univ., Cleveland, Ohio. Dept. of Earth Sciences.
For primary bibliographic entry see Field 2H.
W77-02994

IMPACT OF URBANIZATION ON WATER YIELD, FLOOD PEAK SEDIMENT YIELD, AND WATER QUALITY IN THE BERKELEY HILLS, CALIFORNIA,
California Univ., Berkeley. School of Forestry and Conservation.
J. R. McBride.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 077, Price codes: A02 in paper copy, A01 in microfiche. California Water Resources Center, Davis, Completion Report, September 1976. 16 p, 7 fig, 3 tab, 5 ref. (California Water Resources Center Project UCAL-WRC-W-445). OWRT A-049-CAL(1).

Descriptors: *Urbanization, *Watersheds(Basins), *Sediment yield, *Flood peak, *Water quality, *Water yield, *California, Watershed management
Identifiers: Berkeley Hills(Calif), Urban watershed.

The objective was to determine the impact of urbanization on the hydrologic characteristics of watersheds in the Berkeley Hills of central California. The initial approach was to calibrate three stream gaging stations prior to the development of one watershed above one of these stations and to follow changes in hydrologic characteristics during and subsequent to development. Economic and political developments in 1974 and 1975 prevented the developer from building on the principal watershed. A summary of data on annual water yield, characteristics of flood peaks, sediment yield, and water quality for the three non-urban watersheds is presented. A subproject completed during the study compared periodicity of streamflow in previously urbanized and non-urbanized watersheds in the Berkeley Hills. Two daily discharge peaks which lagged 1.5 hours behind two daily peaks in lawn irrigation were observed. Peak daily streamflow on the urbanized watershed was 10 times that of a similar non-urbanized watershed. The stream from the urbanized watershed ceased flowing from late July until mid-October. (Snyder-California, Davis)
W77-02999

4D. Watershed Protection

URBAN HYDROLOGICAL MODELING AND CATCHMENT RESEARCH IN CANADA,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 2A.
W77-02754

URBAN DRAINAGE MODEL COMPARISON FOR A CATCHMENT IN HALIFAX, NOVA SCOTIA,
Nova Scotia Technical Coll., Halifax.
For primary bibliographic entry see Field 2A.
W77-02764

EFFECTS OF MAN ON THE INTERFACE OF THE HYDROLOGICAL CYCLE WITH THE PHYSICAL ENVIRONMENT.
Proceedings of Paris Symposium, September 1974: International Association of Hydrological Sciences, Publication No 113, 1974. 164 p.

Descriptors: *Conferences, *Soil erosion, *Sediment yield, *Urbanization, *Rural areas, Land development, Land use, Watersheds(Basins), Small watersheds, Cities, Runoff, Vegetation effects, Erosion control, Forecasting.

The effects of man's activities on soil erosion in rural and urban areas were discussed. The subject areas covered included: land use, land development, soil cover, soil conservation treatment, sediment yield, sediment loads in rivers, urbanization effects, and evaluation techniques. (See W74-13215; W75-05916; W75-07880; and W77-02772 thru W77-02793) (Humphreys-ISWS)
W77-02771

EFFECTS OF SOIL CONSERVATION TREATMENT ON RUNOFF AND SEDIMENT LOSS FROM A CATCHMENT IN SOUTHWESTERN NEW SOUTH WALES, AUSTRALIA,
Soil Conservation Service of New South Wales, Sydney (Australia). Wagga Research Station.
C. M. Adamson
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment, Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No 113, p 3-14, 1974. 6 fig, 5 tab, 4 ref

Descriptors: *Soil conservation, *Land management, *Demonstration watersheds, Watersheds(Basins), Sediment control, Rainfall, Runoff, Land reclamation, Soil erosion, On-site investigations, Hydrographs, Data collections, Hydrologic data, Flow duration.
Identifiers: *Australia, *New South Wales.

The effects of completely treating one catchment with soil conservation practices were compared with another similar catchment on which no improvements have been undertaken. The effects of soil conservation structures combined with improved land management practices resulted in significant hydrological changes in the treated catchment, namely: (1) Overall reductions in runoff and soil loss have occurred. The overall reduction in runoff is 74% while sediment losses have been reduced by 99%. (2) Much of the reduction in runoff is attributed to the contour furrows which restrict overland flow and increase depression storage. (3) Effects are greatest in years with below average-to-average rainfall. When above average rainfalls are recorded, annual yields of runoff increase but soil losses do not increase proportionately. (4) During storms, the greatest reduction in runoff occurs for the earliest part of the storm. With increasing depths of precipitation, the effect of runoff reduction is less. Eventually, rate of runoff may exceed that from the untreated catchment. (5) Base flows commence at higher discharges and have lower recession values than do base flows from the untreated catchment, and (6) Carrying capacity and pasture production are greatest for the treated catchment. (See also W77-02771) (Humphreys-ISWS)
W77-02772

THE EROSION INDEX AS A FACTOR FOR DETERMINING TURBIDITY IN RIVERS (L'INDICE D'EROSION-FACTEUR DE DETERMINATION DE LA TURBIDITE DES RIVIERES),
For primary bibliographic entry see Field 2J.
W77-02773

EFFECTS OF PULPWOOD HARVESTING ON THE QUALITY OF STREAM WATERS OF FOREST CATCHMENTS REPRESENTING A LARGE AREA IN WESTERN ALBERTA, CANADA,
Northern Forest Research Center, Edmonton (Alberta).
For primary bibliographic entry see Field 5B.
W77-02774

PLANT COVER AND SEDIMENT TRANSPO
TATION IN THE RIVER BASIN OF THE SEI
(LA COUVERTURE VEGETALE ET L
DEBITS SOLIDES DES COURS D'EAU DA
LE BASSIN DE LA SEINE),
For primary bibliographic entry see Field 2J.
W77-02775

THE EFFECT OF AGRICULTURE ON T
SURROUNDINGS OF LAKE BALATON,
University of Agriculture, Keszthely (Hungary)
For primary bibliographic entry see Field 5B.
W77-02776

NATURAL AND HUMAN INFLUENCE ON T
HYDROLOGICAL CYCLE IN SOUTH INDIA
Osmania Univ., Hyderabad (India). Dept. Geology
Y. Janardan Rao, B. E. Vijayam, and J. S. V. L. Narasimham.
In: Effects of Man on the Interface of Hydrological Cycle with the Physical Envi ment, Proceedings of Paris Symposium, S tember 1974. International Association Hydrological Sciences Publication No. 113, p 45, 1974. 1 fig, 1 tab, 10 ref.

Descriptors: *Hydrologic cy *Watersheds(Basins), *Geol *Geomorphology, Agriculture, Drainage, Re voirs, Urbanization, History, Rain Hydrogeology, Runoff, Irrigation.
Identifiers: *India.

South India falls largely in the semiarid zone cept for the western coast. The paper discu the varying physiographical and geolo regimes in this region in relation to the hydro cal cycle. The effects of human activities suc agricultue, drainage, reservoir construction, urbanization on the erosion patterns and on face and groundwater resources were br described. A comparison was made of diffe drainage basins in South India in relation to hydrological and hydrogeological aspects. also W77-02771) (Humphreys-ISWS)
W77-02777

MAN'S IMPACT ON EROSION IN THE RU
ENVIRONMENT: THE INDIAN EXPERIEN
International Hydrological Decade, New D (India). Indian National Committee.
For primary bibliographic entry see Field 4C.
W77-02778

EFFECTS OF MAN'S ACTIVITIES ON E
SION IN RURAL ENVIRONMENTS AN
FEASIBILITY STUDY FOR REHABILITATI
Indonesia Univ., Djakarta. Faculty of Techno
For primary bibliographic entry see Field 4C.
W77-02779

EROSION PHENOMENA IN DRAIN
BASINS REFLECTED BY SEDIMENT FLO
RIVERS (PHENOMENES D'EROSION DES
SINS VERSANTS REFLETES PAR LES TR
PORTS SOLIDES DES COURS D'EAU),
Institutul de Meteorologie si Hidrol Bucharest (Rumania).
For primary bibliographic entry see Field 2J.
W77-02780

THE EFFECT OF AFFORESTATION ON
SION PROCESSES AND SEDIMENT YIELD
Institute of Hydrology, Wallingford (England
For primary bibliographic entry see Field 4C.
W77-02781

APPROACHES TO CONTROLLING ERO
IN RURAL AREAS,
Strathclyde Univ., Glasgow (Scotland). De Civil Engineering.

. Fleming.
: Effects of Man on the Interface of the ydrological Cycle with the Physical Environ-ent; Proceedings of Paris Symposium, Sep-mber 1974. International Association of ydrological Sciences Publication No 113, p 68-, 1974. 12 ref.

escriptors: *Erosion control, *Rural areas, Reviews, Vegetation establishment, Erosion, ediment transport, Sediment control, Planning, and use, Conservation, Adoption of practices, and management.

he intensive utilization of rural areas for the set-ement of expanding populations and for the in-eased production of food and timber can lead to cute sediment erosion problems when careful anning is not implemented. The conservation of il resources, while at the same time permitting eir maximum development for man, calls for search which integrates all the factors relating to e sediment problem in entire basins, followed by e application of research knowledge at the local nd regional level. Considerable experience al-ady exists on practical measures which may be sed to control erosion, including vegetation anagement, land use, and physical control struc-ires. To be effective, conservation measures ust be based on an understanding of all factors volved, human as well as physical. (See also 77-02771) (Humphreys-ISWS)
77-02782

/ATER EROSION AND SEDIMENT ISCHARGE,
osudarstvennyi Gidrologicheskii Institut, Lenin-rad (USSR).
or primary bibliographic entry see Field 2J.
77-02783

REDICTION OF EROSION INTENSIFICA-ION BY MAN,
ruzinskii Nauchno-Issledovatelskii Institut idrotekhniki i Melioratsii, Tiflis (USSR).
or primary bibliographic entry see Field 4C.
77-02784

HE ROLE OF FOREST STANDS IN THE CON-ROL OF EROSION PROCESSES AND OTHER EGATIVE NATURAL PHENOMENA,
. T. Nikolayenko.
n: Effects of Man on the Interface of the ydrological Cycle with the Physical Environ-ent; Proceedings of Paris Symposium, Sep-mber 1974. International Association of ydrological Sciences Publication No. 113, p 83-, 1974.

escriptors: *Erosion control, *Forests, *Water uality, Water pollution, Watersheds(Basins), Ru-off, Trees, Reservoirs, Rivers, Vegetation ef-ects, Slope protection, Potable water, Sediments. dentifiers: *USSR.

ong-term observations and studies to determine he protective functions of tree shrub vegetation evealed the important role that vegetation plays in he removal of sediment from runoff. As a result f many years observation (Moscow region), it has een established that a 30 m wide strip almost en-rely arrests sediment from treeless, arable slopes f length 190-200 m and gradient of 3 deg. Exten-ve investigations showed that forest stands could revent or reduce to a significant extent bank brasion of rivers, reservoirs, and other bodies of ater which causes great damage to the economy. was also shown that forest improves many pro-erties of water such as color, transparency, and ven taste. After passing through a forest stand, ater is purified from ammonia, alkali, and other oxious substances. Numerous experiments evealed one more beneficial feature of forest - it etains not only chemically harmful substances, ut also microbes which are very dangerous to human life. Experiments conducted in various regions of the country (Moscow, Orel, Penza, and elsewhere) showed that after having passed through a 30-40 m wide forest strip, the number of microbes in the water was reduced by a factor of 2 or more. (See also W77-02771) (Humphreys-ISWS)
W77-02785

PREDICTING SEDIMENT YIELD FREQUENCY FOR RURAL BASINS TO DETERMINE MAN'S EFFECT ON LONG-TERM SEDIMENTATION,
Agricultural Research Service, Temple, Tex.
J. R. Williams.
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No. 113, p 105-108, 1974. 2 tab, 5 ref.

Descriptors: *Sediment yield, *Watersheds(Basins), *Iowa, *Nebraska, *Texas, Rural areas, Forecasting, Small watersheds, Frequency curves, Runoff, Erosion control, Soil erosion, Soil types, Land management, Sedimentation, Sediment discharge, Land use, Floods.
Identifiers: Erosion index, Universal soil loss equation.

Long-term sediment yields were used to determine man's effect on sedimentation in a rural environment. Sediment yields for floods of five different frequencies were computed using modified universal soil loss equation to determine a sediment frequency curve. The universal equation was modified by replacing the rainfall energy factor with a runoff rate and volume factor for basin application. Runoff frequency curves used in determining sediment frequency can be obtained from runoff measurements or computed with mathematical models. Man's effect on sediment yield is expressed by the cropping management and the erosion-control-practice factors of the universal equation. The long-term effect can be determined for any particular land use and management system by computing a sediment yield frequency curve with appropriate values of the cropping management and erosion-control-practice factors. The area under the sediment frequency curve is used to obtain the average annual sediment yield, and the slope of the curve indicates the variation in individual storm sediment yields. Since only five different storms are needed to define the sediment frequency curve, many alternative land use and mangement systems can be considered. The procedure is useful in planning land use and management practces for large rural basins. (See also W77-02771) (Humphreys-ISWS)
W77-02786

SOIL COVER GOVERNS SOIL LOSS ON UNITED STATES CLAYPAN SOILS,
Agricultural Research Service, Columbia, Mo. North Central Region Watershed Research Center.
H. G. Heinemann, and F. D. Whitaker.
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No. 113, p 109-113, 1974. 3 fig, 5 ref.

Descriptors: *Soil erosion, *Erosion control, *Land use, *Land use, *Land management, On-site investigations, Hardpan, Clays, Soil management, Cultivated lands, Vegetation effects, Corn(Field), Cultivation, Soil conservation.
Identifiers: Claypan soils.

Soil surveys before 1936 showed that midwestern farmers had lost about 17.5 cm (about one-half) of the original topsoil from the sloping claypan soils in about 70 years of clean-till farming. Production declined rapidly with continued removal of nutrients and topsoil in runoff. Early research showed that the use of adequate fertilzer and good residue management practices were helpful in reducing soil loss except during extremely wet seasons. Soil loss in 1969 from areas sown with corn continuously and grown with previously 'acceptable practices' was 143 tonnes/ha. Most of the soil loss occurred when the soil cover was inadequate. Research (1954-1973) showed that leaving about 50% of the previous crop's residue on the soil surface at planting reduced soil loss to less than one-half that from conventional (clean-tilled) seedbeds. The average annual loss for the 20-year period was 2.69 and 6.05 tonnes/ha, respectively. Research (1970-1973) showed that no-till planting techniques in which corn is planted directly through the previous crop's residue, or in a cover crop, reduced soil loss to about one-eighth that of conventionally tilled corn. The average annual losses were 1.28 and 9.75 tonnes/ha, respectively. Corn yields were nearly equal from all treatments. (See also W77-02771) (Humphreys-ISWS)
W77-02787

SUSPENDED SEDIMENTS FROM URBAN DEVELOPMENT,
Ottawa Univ. (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 4C.
W77-02788

URBANIZATION AND THE PROCESSES OF EROSION AND SEDIMENTATION IN THE RIVER NILE,
Ain Shams Univ., Cairo (Egypt). Dept. of Engineering.
For primary bibliographic entry see Field 4C.
W77-02789

INCREASE OF SEDIMENT TRANSPORT DUE TO LARGE-SCALE URBANIZATION,
National Research Centre for Disaster Prevention, Tokyo (Japan).
For primary bibliographic entry see Field 4C.
W77-02790

EFFECT OF THE GROWTH OF THE WEST PART OF MEXICO CITY ON HYDRODYNAMIC PROCESSES (EFFET DE LA CROISSANCE DE LA PARTIE OUEST DE LA VILLE DE MEXICO SUR LES PROCESSUS HYDRODYNAMIQUES),
Universidad Nacional Autonoma de Mexico, Mexico City. Instituto de Geografia.
For primary bibliographic entry see Field 4C.
W77-02791

SUSPENDED SEDIMENT PRODUCTION AND BUILDING ACTIVITY IN A SMALL BRITISH BASIN,
Exeter Univ. (England). Dept. of Geography.
For primary bibliographic entry see Field 4C.
W77-02792

EFFECT OF LAND DEVELOPMENT ON SOIL EROSION AND SEDIMENT CONCENTRATION IN AN URBANIZING BASIN,
Parsons, Brinckerhoff, Quade and Douglas, Inc., New York.
For primary bibliographic entry see Field 4C.
W77-02793

A NOTE ON EFFICACY OF VEGETATIVE COVERS AND SLOPES ON RUNOFF AND FERTILITY LOSSES IN A SEMI-ARID TRACT OF RAJASTHAN,
S. K. N. Coll. of Agriculture, Jobner (India).
M. R. Bajpai, R. G. Gujar, and G. Singh.
Annals of Arid Zone, Vol. 14, No. 4., p 376-378, December, 1975.

Descriptors: *Slopes, *Slope stabilization, *Slope protection, *Soil erosion, *Erosion control, Soil chemical properties, *Vegetation establishment, Vegetation, Plants, Runoff, Fertility, Soil types, Soil properties, Nutrients, Infiltration, Monsoons, Interception, Erosion, Degradation(Slope), Regime.
Identifiers: Rajasthan, *India.

The effect of erosion on sandy and sandy loam soils in areas with steep slopes was investigated. A field experiment was conducted during the monsoon season to determine the effects of heavy rainfall upon these slopes and the efficiency of various types of vegetation cover in preventing erosion. Runoff, soil losses, fertility losses and infiltration rate are reported. The increase in runoff with increasing slope may be due to greater water velocity: falling rain drops find less time for absorption. Greater soil and water losses were recorded from the bare plots as compared to those covered with vegetation which intercepts raindrops' impact and provides obstruction to the flow of water. Increase in slope reduced the organic carbon and nitrogen content of the soil as fine particles were washed away. Levelled plots gave slightly better infiltration as compared to plots on slopes, but the difference was not significant. (Jamail-Arizona)
W77-02856

SAMPLING AND ANALYSIS OF STORM-WATER RUNOFF FROM URBAN AND SEMI-URBAN/RURAL WATERSHEDS - SYSTEMATIC DEVELOPMENT OF METHODOLOGIES IN PLANNING URBAN WATER RESOURCES FOR MEDIUM SIZE COMMUNITIES,
Purdue Univ., Lafayette, Ind. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 5B.
W77-02995

HYDRAULIC SIMULATION USING DISTRIBUTED PARAMETERS,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2A.
W77-03001

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

DETERMINATION OF MONOHYDRIC LOW-MOLECULAR PHENOLS IN SPENT LIQUORS AND PULP MILL EFFLUENTS (BADANIA NAD OZNACZANIEM JEDNOWODOROTLENOWYCH NISKOCZASTECZKOWYCH ZWIAZKOW FENOLOWYCH W LUGACH I SCIEKACH Z CELULOZOWNI),
B. Pszonka.
Przeglad Papierniczy, Vol. 32, No. 7, p 237-242, July, 1976. 2 fig, 41 ref, 2 tab.

Descriptors: *Pulp wastes, *Phenols, *Gas chromatography, *Pollutant identification, Wastes, Industrial wastes, Water pollution sources, Analytical techniques, Separation techniques, Organic compounds, *Waste identification, Effluents.
Identifiers: *Kraft mills.

A description is given of a method for separating monohydric phenols from kraft mill effluents. The gas chromatographic method was developed on the basis of preliminary experiments with known mixtures of mono-, di-, and trihydric phenols, using various solid and stationary liquid phases for the separation of free phenols, their methyl ethers, and their acetates. The best separation was obtained in columns with 15% silicone oil SE-30 on Gas Chrom Q 80/100 mesh. The di- and trihydric phenol could be separated only after conversion of the ethers (acetates were less well suited), but the determination errors were great, and further studies are needed for the development of a better procedure. Monohydric phenols (phenol, cresols, xylenols, and chlorophenols) could be separated and identified in the presence of nontoxic phenolic compounds (guaiacol, acetovanillone, acetosyringone) with an accuracy of 5%. The application of this method to effluents from 4 kraft mills (black liquors, evaporator condensates, and overall effluents before and after purification) showed a phenol composition similar qualitatively but different quantitatively in all samples. A comparison with the results of determinations by the standard 4-aminoantipyrine method confirmed the assumption that the content of toxic phenols is much lower than the content of total phenols as determined by the standard method. (Stapinski-IPC)
W77-02579

METHOD FOR DETERMINATION OF GLYPHOSATE RESIDUES IN NATURAL WATERS BASED ON POLAROGRAPHY OF THE N-NITROSO DERIVATIVE,
Norges Landbrukshoegskole, Vollebekk. Chemical Research Lab.
J. O. Bronstad, and H. O. Friestad.
The Analyst, Vol 101, No 1207, p 820-824, October 1976. 4 fig, 9 ref.

Descriptors: *Water analysis, *Pollutant identification, *Polarographic analysis, *Herbicides, Water pollution sources, Trace elements, Natural streams, Chromatography, Anion exchange, Nitrogen compounds, Analytical techniques, Water chemistry, Water properties.
Identifiers: Glyphosate, N-phosphonomethylglycine.

A differential-pulse polarographic method for the determination of residues of glyphosate (N-phosphonomethylglycine) herbicide in natural waters down to 35 micrograms/liter is described. The material is concentrated by chromatography on an anion-exchange column, which at the same time performs the sole purification required. A polarographically active glyphosate derivative is obtained by nitrosation performed directly in a fraction of the eluate from the column. The precision in terms of relative standard deviation varies from 22.8% at the detection limit to 2.3% at 210 micrograms/liter. The total analysis time for one sample is 3-4 hr. (Witt-IPC)
W77-02582

AUTOMATION OF TOTAL PHENOLIC CONTENT DETERMINATION WITH THE FOLIN-CIOCALTEU REAGENT. APPLICATION TO THE STUDY OF WASTE WATERS FROM FIBERBOARD MILLS (AUTOMATISATION DE LA METHODE DE DOSAGE DES COMPOSES PHENOLIQUES TOTAUX PAR LE REACTIF DE FOLIN-CIOCALTEU. APPLICATION A L'ETUDE DES EAUX RESIDUAIRES DES USINES DE PANNEAUX DE FIBRES DE BOIS),
Institut National de la Recherche Agronomique, Dijon (France). Technologie.
G. Albagnac, J. Sarris, J-N. Morfaux, and A. Djian.
Industries Alimentaires et Agricoles, Vol 92, No 9/10, p 1047-1053, 1975. 3 fig, 8 ref, 3 tab.

Descriptors: *Pulp wastes, *Phenols, *Water analysis, Colorimetry, Automation, Wastes, Industrial wastes, Water pollution sources, Analytical techniques, *Water reuse, *Recycling, Organic compounds, Aromatic compounds, Chemical analysis, *Pollutant identification, Effluents.
Identifiers: Folin-Ciocalteau reagent, Board mills, Insulation boards, Hardboards, Hot-pressed boards.

Colorimetric determination of total phenolics with the Folin-Ciocalteu reagent was automated using a continuous flow analyzer, and applied to the monitoring of waste water from a fiberboard mill. Data are presented concerning the influence of waste water recycling and of modifications of various manufacturing conditions (pressing temperature and platen-press schedule) on total phenolic levels. (Speckhard-IPC)
W77-02584

GRAPHICAL INTERPRETATION OF WATER QUALITY DATA,
Mississippi State Univ., Mississippi State. Dept. of Civil Engineering.
J. L. Mahloch.
Water Air Soil Pollut. 3(2), p 217-236, 1974.

Descriptors: *Water quality, *Data collection, Pollutant identification, *Graphical methods, Analytical techniques, Water pollution, Data processing.

Management of water resources through planning and control of water pollution hinges on the availability and interpretation of water quality data on which to base management decisions. Graphical methods are explored which allow rapid and informative analysis of water quality data. The graphical methods fall into 2 main categories. The 1st category relates to graphical procedures which are developed as part of a statistical test, such as discriminant analysis. The 2nd category involves approximation of multivariate water quality data into 2 dimensions. The methods for accomplishing the latter are canonical decomposition and higher dimensional plotting. Each of these methods is developed and used on an example set of data to demonstrate their utility. These methods not only present a graphical representation of the data, but also explain variations and interrelationships within the data itself.—Copyright 1975, Biological Abstracts, Inc.
W77-02592

COMPARATIVE METHYLATION CHEMISTRY OF PLATINUM, PALLADIUM, LEAD, AND MANGANESE,
California Univ., Livermore. Lawrence Livermore Lab.
R. T. Taylor.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-251 55. Price codes: A03 in paper copy, A01 in microfiche. Report EPA-600/1-76-016, March 1976. 25 p., tab., 11 fig., 14 ref.

Descriptors: *Biochemistry, *Metals, *Lead, *Manganese, *Toxicity, Vitamins, Metabolism, Transportation, Chemical wastes, Fuel, Gasoline, *Public health, Mammals, *Air pollution, Air pollution effects, Human disease, Aquatic environment.
Identifiers: *Platinum, *Palladium, *Methylation(Biochemical), Fuel additives, Automotive fuels, Catalytic control devices, Methylcobalamin, Platinum 4+, Mammalian cells.

A study was carried out to evaluate the potential for platinum, palladium, lead, and manganese salts and oxides to be biochemically methylated. Methylation is an important, well recognized determinant of metal toxicity; the striking example being the extreme health hazard of methylated mercury. The possible biological methylation of the metals which are associated with emissions arising from the use of automotive fuels, fuel additives, and catalytic control devices is of special concern to the Environmental Protection Agency's Catalyst Research Program. Salts of platinum, palladium, and lead, and oxides of lead all containing the metal in a 4+ valence were observed to demethylate methylcobalamin, a biologically active form of vitamin B-12. Inorganic salts and oxides of manganese were unreactive. No evidence for a stable monomethyl-metal derivative was found using palladium and lead compounds as reactants. However, salts of platinum 4+ do result in the formation of stable methylation product

he reaction product formed from methyl-obalamin and hexachloroplatinate was shown efinitively to be a monomethyl-platinum com-ound. It is sufficiently stable in aqueous solutions nder a variety of conditons to exist in freshwater cosystems and to exhibit toxic effects on mam-alian cells. (Katz)
/77-02623

ESTICIDE RESIDUE ANALYSIS IN WATER .03.1), TRAINING MANUAL,
nvironmental Protection Agency, Cincinnati, hio. Office of Water Program Operations.
. F. Hallbach.
vailable from the National Technical Informa-on Service, Springfield, VA 22161 as PB-238 072, rice codes: A13 in paper copy, A01 in microfiche. eport EPA-430/1-74-012, September 1974. 425 p., 5 tab., 46 fig., 125 ref.

escriptors: *Methodology, *Water chemistry, Water quality, Gas chromatography, Public ealth, Instrumentation, *Pesticides, *Waste entification, *Environment, Environmental con-ol, *Aquatic environment, *Chemical analysis, nfrared radiation, Sampling, *Organochlorine esticides, *Organophos-phorous pesticides, In-ustrial effluents, *Pesticide residues, Pollutant entification.
dentifiers: Infrared spectroscopy, Pesticide sidue analysis, *Training manuals.

raining manual contains outlines of course aterial for the conduct of a training course in esticide residue analysis. Includes an introduc-on to pesticide residue analysis and progresses to advanced use of the gas chromatograph. Katz)
/77-02624

RACE HYDROCARBON ANALYSIS: THE NA-IONAL BUREAU OF STANDARDS, PRINCE 'ILLIAM SOUND/NORTHEASTERN GULF OF LASKA, BASELINE STUDY,
ational Bureau of Standards, Washington, D. C. nalytical Chemistry Div.
. N. Chesler, B. H. Gump, S. H. Hertz,, W. E. yszel, and D. P. Enagonio.
vailable from the National Technical Informa-on Service, Springfield, VA 22161 as PB-249 538, rice codes: A05 in paper copy, A01 in microfiche. BS Technical Note 889, January 1976. 66 p., 4 b., 24 fig., 18 ref.

escriptors: *Oil, *Oil pollution, Gas chromatog-phy, Mass spectrometry, *Baseline studies, Analytical methods, *Pacific Ocean, Water pollu-on, *Alaska, Mussels, Mytilus, Sediment, enthic fauna, Methodology, Monitoring, Organic compounds, Pollutant identification.
entifiers: Liquid chromatography, Petroleum alysis, *Trace hydrocarbon analysis, Volatile drocarbons, Benzpyrenes, *Gulf of Alaska, Prince William Sound(Alaska).

he low concentration of hydrocarbons an-ipated in pollution baseline studies necessitates e development of analytical techniques sensitive the sub-microgram per kilogram concentration vel. The method of analysis developed in this oratory involves dynamic headspace sampling r volatile hydrocarbon components of the sam-e followed by coupled-column liquid chromatog-phy for the non-volatile components. These chniques require minimal sample handling, ducing the risk of sample component loss and/or mple contamination. Volatile sample com-nents are separated from the matrix in a closed stem and concentrated on a TENAX-GC packed e-column, free from large amounts of solvent d ready for GC/GC-MS analysis. Non-volatile mpounds, such as the benzpyrenes, may be ex-cted from large volumes of water and concen-ted on a Bondapak C18 packed pre-column for upled-column liquid chromatographic separa-n and analysis. Results of the application of these techniques are presented and discussed. (Katz)
W77-02628

CADMIUM IN THE ENVIRONMENT - III: A TOXICOLOGICAL AND EPIDEMIOLOGICAL APPRAISAL,
Karolinska Institutet, Stockholm (Sweden).
For primary bibliographic entry see Field 5B.
W77-02633

MEDICAL AND BIOLOGIC EFFECTS OF ENVIRONMENTAL POLLUTANTS. CHROMIUM.
National Research Council, Washington, D.C. Committee on Biologic Effects of Atmospheric Pollutants.
For primary bibliographic entry see Field 5C.
W77-02635

COMPILATION OF STATE DATA FOR EIGHT SELECTED TOXIC SUBSTANCES, VOL. V, MONITORING PROGRAM CAPABILITY, DESCRIPTOR TABLES,
Mitre Corp., McLean, Va.
For primary bibliographic entry see Field 5G.
W77-02641

COMPILATION OF STATE DATA FOR EIGHT SELECTED TOXIC SUBSTANCES. VOLUME II, DIRECTORY OF STATE TOXIC SUBSTANCES MONITORING AGENCIES,
Mitre Corp., McLean, Va.
For primary bibliographic entry see Field 5G.
W77-02642

SAMPLING AND ANALYSIS OF SELECTED TOXIC SUBSTANCES. TASK II-ETHYLENE DIBROMIDE,
Midwest Research Inst., Kansas City. Mo.
J. Going, and S. Long.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-246 213, Price codes: A03 in paper copy, A01 in microfiche. Report EPA-560/6-75-001, September 1975. 30 p, 5 tab, 10 fig, 11 ref.

Descriptors: *Monitoring, *Organic compounds, *Chemical analysis, *Bromine, Halogens, *Water pollution, *Air pollution, *Path of pollutants, *Pollutant identification, Public health, Industrial wastes, *Sampling, *Bromides.
Identifiers: *Ethylene dibromide, Potential carcinogen, *Pesticide, *Fumigant, Retail gasoline station, Oil refinery, Ambient air level.

Ethylene dibromide has recently been reported by the NCI to be a potential carcinogen. Its commercial use is predominantly as a scavenging agent for lead in gasoline. A minor usage is a pesticide fumigant. A protocol was developed for the sampling and analysis of ethylene dibromide in ambient air and surface water. The range in concentration of ethylene dibromide in the air and the site where it was collected are as follows: manufacturing sites, 4.2 to 115 micrograms/M3; oil refinery, 0.23-1.65 micrograms/M3; urban locations near retail gasoline stations and with heavy vehicular traffic, 0.069 to 0.11 micrograms/M3. Two water samples collected from streams near an oil refinery and a manufacturing site were found to contain 1.13 and 1.05 ppb ethylene dibromide, respectively. Further work to clarify ambient air levels and to assess whether they may represent a health risk is anticipated, but the very low levels detected to date are not thought to present a significant risk to health. (Katz)
W77-02644

NOAA'S ACTIVITIES IN ENERGY RELATED MEASUREMENT AND MONITORING,
National Oceanic and Atmospheric Administration, Rockville, Md.
For primary bibliographic entry see Field 5G.
W77-02652

WATER MEASUREMENT AND MONITORING IN ENERGY DEVELOPING AREAS,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 5G.
W77-02653

SCANNING THERMAL PLUMES,
Wisconsin Univ., Madison. Marine Studies Center.
F. L. Scarpace, R. P. Madding, and T. Green, III.
Sea Grant College Reprint No. WIS-SG-76-362, Reprinted from: Photogrammetric Engineering and Remote Sensing, Vol 41, no. 10, p 1223-1232, October 1975. 17 fig, 2 tab, 5 ref.

Descriptors: *Powerplants, *Thermal pollution, *Water pollution, *Wisconsin, *Lake Michigan, Thermal plumes, Temperature, *Pollutant identification, *Remote sensing, Path of pollutants.
Identifiers: *Temperature gradient, Airborne thermal scanners, Scanners, Ground truth data.

Thermal plumes associated with the condenser cooling of power plants despite their small size are difficult to characterize. Over 800 thermal line scans of power plant plumes taken during the past three years indicated that their mixing with the nearshore lake water is extremely complex and highly dependent on envrionment conditions. A cooperative effort to monitor all thermal plumes along the Wisconsin shore of Lake Michigan has been undertaken. Since December 1972, thermal line scans of all the major power plants in the State of Wisconsin have been acquired on a twice weekly basis. An overview of the techniques used at the University of Wisconsin for analyzing thermal scanner data as applied to the imagery from the Point Beach power plant at Two Creeks, Wisconsin (on Lake Michigan) is described. (NOAA)
W77-02682

CONCENTRATIONS AND CONCENTRATION FACTORS OF HEAVY METALS IN BROWN ALGAE,
University Coll. of North Wales, Menai Bridge. Marine Science Labs.
P. Foster.
Environmental Pollution, Vol. 10, p. 45-53, 1976. 1 fig., 4 tab., 15 ref.

Descriptors: *Absorption, Algae, *Heavy metals, *Phaeophyta, Zinc, Copper, Nickel, Manganese, *Bioindicators, *Trace elements, Cadmium, Lead, Chromium, Monitoring, Analytical techniques, Environmental effects, *Marine algae, *Pollutant identification.
Identifiers: Bioaccumulation, *Fucus sp., *Ascophyllum sp., *Menai Straits.

Concentrations and concentration factors of zinc, copper, manganese, and nickel in Fucus vesiculosus and Ascophyllum nodosum collected from the Menai Straits are presented. Temporal variations in dissolved trace metal concentrations to which these algae are exposed have been intensively monitored for several years. Algal concentrations are compared with those of similar samples taken from a highly polluted area. Both species are recommended as potential biological indicators for copper. F. vesiculosus is more sensitive to increases in the mean ambient dissolved concentrations of zinc. For neither species does a direct relationship exist between concentrations of iron and manganese in the weeds and water. Algal concentrations of cadmium, lead and chromium are also discussed. In highly polluted environments algal concentrations of minor elements do not reflect the water concentrations to which they have been exposed. (Katz)
W77-02698

TOXICITY OF THE SURGEON FISHES-II PROPERTIES OF THE PRINCIPAL WATER SOLUBLE TOXIN,
Tohoku Univ., Sendai (Japan). Faculty of Agriculture.
For primary bibliographic entry see Field 5C.
W77-02700

PHYTOPLANKTON PRODUCTION MEASUREMENTS WITH CARBON-14 WITH CONSIDERATION OF LABELED ORGANIC MATTER LOSSES DURING FILTRATION, (IN RUSSIAN),
Akademiya Nauk SSSR, Leningrad. Zoologicheskii Institut.
V. V. Bul'on.
Okeanologiya 15(3), p 503-507, 1975.

Descriptors: *Phytoplankton, *Plankton, *Carbon filters, Filtration, Coasts, Oxidation, Photosynthesis, Photosynthetic oxygen, *Primary productivity, *Organic matter, Asia, Pollutant identification.
Identifiers: *Carbon-14, Organic matter, Losses, Permanganate, Plankton radioactivity.

Plankton primary production was determined by the 14C method at 9 stations in the coastal waters of eastern Asia. Losses of labeled organic matter during filtration of the samples were as great as 49% of the assimilated C. The major part of the lost photosynthetic product was represented by chemically stable compounds because oxidation with permanganate was only 10-40% of that of the more effective photooxidation method. The inverse relationship between plankton radioactivity on the filters and the duration of filtration indicates that the appearance of photosynthetic products on the filters is primarily a consequence of mechanical damage of phytoplankton cells during filtration.--Copyright 1976, Biological Abstracts, Inc.
W77-02704

TOXICITY OF WATER-SOLUBLE FRACTIONS OF FOUR TEST OILS FOR THE POLYCHAETOUS ANNELIDS, NEANTHES ARENACEODENTATA AND CAPITELLA CAPITATA,
Texas A and M Univ., College Station. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W77-02716

A SEQUENTIAL APPROACH TO THE COUNTING OF PLANKTON ORGANISMS,
Pavia Univ. (Italy).
For primary bibliographic entry see Field 7B.
W77-02721

DETERMINATION OF SMALL AMOUNTS OF MERCURY,
Kodak (Australasia) Pty Ltd., Coburg (Australia). Research Labs.
S. Chilov.
Talanta. 22(3), p 205-232, 1975.

Descriptors: *Mercury, *Pollutant identification, Trace elements, Analytical techniques, Emission spectroscopy, Polargraphic analysis, Colorimetry, Chromatography, X-ray analysis.

Since analysis for trace amounts of Hg is most often carried out on environmental samples (tissue, water, air) most methods of analysis will encounter at least some interference as well as being dependent on preliminary digestion to bring Hg into solution in the desired form. The following techniques and their advantages and disadvantages are discussed: X-ray fluorescence, spectrographic emission, electrochemistry (polarography), colorimetry, atomic fluorescence, radiochemistry, neutron activation, isotope dilution, chromatography, conventional atomic absorption and its flameless and cold vapor modifications, concentration by amalgamation and sample combustion.--Copyright 1975, Biological Abstracts, Inc.
W77-02729

METHODS OF INVESTIGATING PHYTOBENTHOS OF CONTINENTAL WATER BODIES, (IN RUSSIAN),
Akademiya Nauk SSSR, Novosibirsk. Central Siberian Botanical Garden.
G. D. Levadnaya.
Gidrobiol Zh 11(3); p 85-90, 1975.

Descriptors: *Benthos, *Biomass, *Algae, *Aquatic algae, Chlorophyll, Bodies of water, Bottom sediments, Silts, Sands, Cytological studies, *Pollutant identification
Identifiers: *Phytobenthos, USSR, Ob River, Enisei River.

A review is given of the literature on methods of quantitative evaluation of the biomass of algae, which can be expressed in dry, air-dry, ashless-dry and fresh weight; in the content of chlorophyll and biogenic elements; and in calories. The most convenient method of recording the biomass on soft bottom deposits (silts, silty sands) is the count-volume method: algae collected from a known area of the bottom are counted and knowing the average weight of the dominant species, the total biomass is determined. Data are given on the average weight of cells of the main forms of algae (24 spp.) of the Ob and Enisei rivers (USSR).--Copyright 1976, Biological Abstracts, Inc.
W77-02742

INSTRUMENTATION FOR FIELD STUDIES OF URBAN RUNOFF,
Canada Centre for Inland Waters, Burlington (Ontario)
J. Marsalek
Canada-Ontario Agreement on Great Lakes Water Quality, Research Report No. 42, Environmental Protection Service, Environment Canada, Ottawa, Canada, 1974, 82p., 27 fig., 7 tab, 36 ref,. 1 append. 73-3-12.

Descriptors: *Instrumentation, *Urban runoff, Precipitation(Atmospheric), Sewage, Waste water treatment, Flow, Sampling, Gauges, Measurement, *Monitoring, Pollutant identification, Water pollution sources
Identifiers: Sensors, Recorders.

Instrumentation and monitoring techniques for field studies of urban runoff are examined. In particular, the following types of instruments were studied: recording precipitation gauges; sewer flow measurement instruments; and, automatic wastewater samplers. After reviewing the literature and surveying the market, some of the promising instruments were acquired, tested in the laboratory and operated in the field for various time periods. Individual instruments are discussed with regard to their technical data, accuracy and reliability. Recommendations for the selection, interfacing and installation of the instruments are given. (Environment Canada)
W77-02749

LEVELS OF ARSENIC AND SELENIUM IN THE GREAT LAKES REGION,
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
W. J. Traversy, P. D. Goulden, Y. M. Sheikh, and J. R. Leacock.
Water Quality Branch, Scientific Series No 58, 1975. 18 p, 8 fig, 17 tab, 29 ref.

Descriptors: *Great Lakes, *Arsenicals(Pesticides), Industrial wastes, Water pollution, *Great Lakes Region, Rivers, Lakes, Water analysis, Sediments, Fish, Fallout, Rain, Toxins, Sampling, *Pollutant identification, Water pollution sources.
Identifiers: *Arsenic, *Selenium.

Arsenic and selenium were determined in water, sediments and fish samples from the international Great Lakes, in water samples from international rivers and selected rivers in Ontario and in precipitation samples from the Great Lakes region, to assess their present levels and to provide base-line data for future reference. Mean values for arsenic in lake waters varied from 0.23 micro g/l for Lake Superior to 0.91 micro g/l for Lake Ontario, and mean sediment values ranged from 2.03 micro g/g for Lake Superior to 3.20 micro g/g for Lake Erie. The mean arsenic fish value for lakes Erie and Ontario was 0.07 micro g/g. Analyses of waters from the St. Marys and St Lawrence rivers showed mean arsenic values of 0.37 micro g/l and 0.61 micro g/l, respectively, and the mean value of other rivers in Ontario was 0.26 micro g/l. The mean precipitation arsenic value was 0.72 micro g/l. Mean selenium values for lake waters were less than 0.1 micro g/l for all of the Great Lakes and mean sediment values ranged from 0.63 micro g/g for Lake Superior to 1.00 micro g/g for Lake Ontario. Mean fish values from lakes Erie and Ontario were 0.05 micro g/g and 0.06 micro g/g, respectively. The St. Marys and St Lawrence rivers showed mean selenium values of less than 0.1 micro g/l, as did other rivers tested in Ontario. The mean precipitation selenium value was 0.29 micro g/l. (Environment Canada)
W77-02751

ASBESTIFORM FIBRE LEVELS IN LAKES SUPERIOR AND HURON,
Canada Centre for Inland Waters, Burlington (Ontario)
For primary bibliographic entry see Field 5B.
W77-02753

COMPUTERIZED SCHEME FOR THE IDENTIFICATION OF AEROMONADS AND MEMBERS OF THE FAMILY ENTEROBACTERIACEAE,
Canada Centre for Inland Waters, Burlington (Ontario).
W. E. Lowe.
Inland Waters Directorate Scientific Series No. 57, 1975, 33p., 2 fig., 7 tab, 31 ref., 2 append.

Descriptors: *Aeromonads, *Enteric bacteria, Classification, Computers, Aquatic bacteria, Mathematical models, Methodology, Testing, *Computer programs, Coliforms, *Pollutant identification
Identifiers: *Enterobacteriaceae.

A system is described which combines practical and theoretical concepts into a workable system for the routine and simultaneous identification of large numbers of Aeromonas isolates and members of the Family Enterobacteriaceae. The identification method is based on computerized determination of conditional probabilities of two state characters, using estimations of likelihood rather than Bayesian probability. The multipoint inoculation procedures used, coupled with small quantities of media in non-disposable racks and vials reduce the costs considerably below those of commercially available multi-test single inoculation systems. The reliability of the system, determined for a range of hospital isolates, approaches 90 percent, and with isolates from water the accuracy approaches 100 percent. (Environment Canada)
W77-02758

STUDY OF THE SOLUBILITY OF OIL IN WATER,
Ottawa Univ. (Ontario). Dept. of Civil Engineering.
B. C. Y. Lu, and J. Polak.
Technology Development Report EPS-4-EC-76-1, Environmental Protection Service, Environment Canada, Ottawa, Canada, February 1976, 25 p., 5 fig., 11 tab., 11 ref

Descriptors: *Oil, *Water analysis, *Oil-water interfaces, Solubility, Fuels, Time, Pollutant identification, Oil wastes.
Identifiers: Bunker oil, Crude oil, Removal rates(Oil).

Experiments were conducted to determine the total solubility of oil in water. Three oils were employed; Number 2 fuel oil, medium bunker fuel, and western crude oil. The total solubilities of these oils were determined by dissolution tests and by static equilibrium tests; both testing procedures attained similar results. The maximum solubilities and the lengths of time in which these were attained were of the following orders of magnitude; Number 2 fuel oil, 7.5 ppm, attained in 5 days; medium bunker fuel, 2.3 ppm, attained in 2 days; and western crude oil, 46 ppm, attained in 8 days. The rates of removal of the dissolved components from solution in water were also investigated. The time duration of removal was analagous to the time duration for the attainment of maximum concentration. Traces of soluble hydrocarbons were found to persist for at least 13 days after their introduction into solution. (Environment Canada)
W77-02765

PROCEDURE FOR EXAMINATION OF WATER AND SEDIMENT SAMPLES FOR TOTAL ASBESTOS FIBRE COUNT BY ELECTRON MICROSCOPY,
Canada Centre for Inland Waters, Burlington (Ontario).
M. R. Thompson.
Inland Waters Directorated Technical Bulletin No. 94, 1976, 4 p., 2 fig., 1 tab., 9 ref.

Descriptors: *Asbestos, *Water analysis, *Sediments, *Electron microscopy, *Lake Superior, Sampling, Lakes, Equipment, *Pollutant identification.
Identifiers: *Fibers(Asbestos), Fibre count(Asbestos).

In 1973, a major investigation of asbestos fibers in water and sediment samples of Lake Superior began at Canada Centre for Inland Waters. A procedure for obtaining total fibers per litre of water samples was developed. This report documents that procedure, describing problems encountered and suggested solutions, and outlining the mathematical equations for determining fibers per litre. (Environment Canada)
W77-02766

POLYCHLORINATED BIPHENYLS (PCB'S) IN MUNICIPAL WASTEWATERS: AN ASSESSMENT OF THE PROBLEM IN THE CANADIAN LOWER GREAT LAKES,
Environmental Protection Service, Burlington Ontario). Waste Water Technology Centre.
E. E. Shannon, F. J. Ludwig, and I. Valdmanis.
Canada-Ontario Agreement on the Great Lakes Water Quality, Research Report No. 49, 1976, 28 p., 4 fig., 5 tab., 17 ref., append. 73-3-8.

Descriptors: *Polychlorinated biphenyls, Municipal wastes, Waste water treatment, Sewage treatment, Aroclors, Sludge, Degradation(Decomposition), Cities, Industries, Aquatic environment, Canada, Separation techniques, Pollutant identification.
Identifiers: Ontario, Physical separation.

A survey of polychlorinated biphenyls (PCB's) concentrations in the raw wastewaters from 33 municipalities was carried out. In addition, detailed investigations of the fate of PCB's during conventional secondary treatment were performed at the Hamilton Wastewater Treatment Plant. PCB concentrations in raw wastewaters ranged from less than 0.1 to 1.8 ppb, with the industrial areas of Hamilton, Toronto and Windsor exhibiting the highest levels. Only the 1254 and 1260 Aroclors were detected in any of the wastewaters. The primary treatment facilities surveyed removed, on the average 50% of the PCB load, whereas the secondary plants averaged 66% removal. PCB concentrations in digested sludges ranged from 0.6 to 76.6 ppm (dry weight). PCB removal during wastewater treatment is largely by accumulation in the primary and/or waste activated sludge streams. There seemed to be little biodegradation. There are indications that multiple-hearth incineration may destroy the PCB's encountered in dewatered sludges. However, more experimental work is necessary to substantiate this observation. (Environment Canada)
W77-02768

ACID PRECIPITATION,
Cornell Univ., Ithaca, N.Y. Section of Ecology and Systematics.
For primary bibliographic entry see Field 2B.
W77-02800

APPLICATIONS OF DIRECT AQUEOUS INJECTION GAS CHROMATOGRAPHY AND FREEZE CONCENTRATION FOR THE DETERMINATION OF ORGANIC COMPOUNDS IN WATER AND WASTE WATERS,
Canada Centre for Inland Waters, Burlington (Ontario).
M. E. Fox.
American Society for Testing and Materials Special Technical Publication 573, p. 242-250, 1975. 6 fig., 1 tab., 9 ref.

Descriptors: *Organic compounds, *Analytical techniques, *Gas chromotography, Pollutants, Sewage effluents, Water pollution, *Pollutant identification, Water analysis.

The successful analysis of methanol and aircraft deicer (a 2:1 mixture of ethylene glycol plus propylene glycol with traces of other compounds) in wastewater and a preliminary attempt to analyze a pulp mill effluent plume in a water body are described. To detect methanol in sewage to less than 1 ppm, a porous polymer column packing material was chosen; when the column temperature was lowered to 70C the water response appeared as a very low flat-topped mound with the methanol appearing as a normal sharp peak on top of the mound. The duration of the water response for a 5 microliter injection was about 50-60 seconds and the low molecular weight organic compounds could be differentiated from methanol retention times. Higher molecular weight compounds were either retained in the removable injection port liner or eluted so slowly that significant baseline deflections were noted, thus producing results with little sample pretreatment, a speed of 50+ samples/hr, and sufficient precision. The aircraft deicer was analyzed at a 160C column temperature, when the two major components eluted together as a single peak, and could be reported as mgC/1. Freezing to offset the dilution of an organic effluent plume was limited to achievement of no more than a 15 X concentration due to high levels of inorganic salts. (Auen-Wisconsin)
W77-02809

A METHOD FOR THE DETERMINATION OF MERCURY IN SEDIMENTS BY THE AUTOMATED COLD VAPOR ATOMIC ABSORPTION TECHNIQUE AFTER DIGESTION,
Canada Centre for Inland Waters, Burlington (Ontario).
H. Agemian, and A. S. Y. Chau.
Analytica Chimica Acta, Vol. 75, p. 297-304, 1975. 2 fig., 2 tab., 25 ref.

Descriptors: *Mercury, *Analytical techniques, Sediment-water interfaces, Digestion, *Pollutant identification, Methodology, *Sediments.
Identifiers: Cold vapor mercury analysis, Atomic absorption techniques.

In order to determine the mercury content of a sample it is necessary to extract the inorganic mercury and to liberate mercury from organomercurials by oxidation of the organic matter because all forms of mercury introduced into the aqueous environment end up adsorbed on fine-grained particles, such as iron oxides, sulfide surfaces and on clay particles, and to be present as inorganic phosphorus complexes, in humate complexes, and as methyl- and dimethyl-mercury produced by microbial activity. A manual method for the extraction of inorganic mercury and the oxidation of organomercurials has been modified and incorporated into an automated procedure for the determination of mercury in sediments. The method includes digestion of the wet sediment with sulfuric and nitric acids followed by oxidation of the organomercurials with potassium permanganate and potassium persulfate. Errors caused by coprecipitation and adsorption of mercury on manganese dioxide are avoided by reduction of the dioxide with a solution of hydroxyammonium sulfate and sodium chloride. The mercury content in solution is determined by a cold vapor technique with tin(II) sulfate as a reductant in an automated system. This method can detect down to 10 ppb of mercury in sediment (based on 1 g samples) and can automatically handle 20 samples per hour after manual digestion. (Auen-Wisconsin)
W77-02811

NEW AUTOMATED COLORIMETRIC METHOD FOR THE DETERMINATION OF CHLORIDE USING CHROMOTROPIC ACID,
Canada Centre for Inland Waters, Burlington (Ontario).
B. K. Afghan, R. Leung, A. V. Kulkarni, and J. F. Ryan.
Analytical Chemistry, Vol. 47, p. 556-559, 1975. 4 fig., 1 tab., 9 ref.

Descriptors: *Chlorides, *Analytical techniques, *Colorimetry, Measurement, *Pollutant identification, Water analysis.

Under the experimental condition used during formaldehyde analysis, chloride ion catalyzed the conversion of nitrate to nitrite and the resultant nitrite reacted with chromotropic acid to produce strongly colored species. This triggered the development of a colorimetric method for chloride measurement in water in the range of 0.25-100 mg/l at the rate of 20 samples per hour. Variation of temperature and time of color development have a pronounced effect on the intensity of color production by the reaction of chloride, nitrate, and chromotropic acid. A maximum sensitivity was achieved using 25 mg/l of nitrate at 75C in a working range between 0.25-30 mg/l, but the range of calibration curve can be altered to cover a 1-100 mg/l range. The optimum concentration of chromotropic acid required to analyze chloride in the 1-100 mg/l range was 0.25%. No major and minor ions, or organic compounds normally found in water produced interference. All absorption measurements were carried out using a 505-nm narrow pass filter making it possible to cover a chloride concentration range between 0.25-100 mg/l. This method can be directly applied to the analysis of natural waters and possibly to waste waters. (Auen-Wisconsin)
W77-02812

CONCENTRATIONS OF COPPER, IRON, LEAD, NICKEL AND ZINC IN FRESHWATER ALGAL BLOOMS,
University Coll. of Swansea (Wales). Dept. of Botany and Microbiology.
D. R. Trollope, and B. Evans.
Environmental Pollution, Vol. 11, p. 109-116, 1976. 3 tab., 18 ref.

Descriptors: *Heavy metals, *Bioassay, *Algae, Absorption, Copper, Iron, Lead, Nickel, Zinc, Europe, Monitoring, Chlorophyta, Cyanophyta, Pollutant identification.
Identifiers: *Lower Swansea Valley(England), Bioconcentration, Xanthophyta.

The ability of freshwater algae to absorb and concentrate heavy metals was measured near zinc smelting wastes in the Lower Swansea Valley, England. The majority of the algae were filamentous and all were Chlorophyta except Tribonema (Xanthophyta) and Oscillatoria (Cyanophyta). Metal concentrations in algal tissue varied with genus and within a genus, e.g., the four Tribonema blooms exhibited three- to fourfold differences for copper, iron and lead and in the four Spirogyra concentrations varied from fivefold to twentyfold for all five metals. The large differences in the range of concentration factors exhibited within each algae group were apparent for all metals except lead where tenfold differences were present in the three algal groups. For zinc there was a linear correlation between water concentration and algal concentration. It was unclear whether differences observed for the other metals were due to differences in environmental conditions or to differences due to the nature of the algae. However, an examination of the four Tribonema blooms showed that their variation in metal content was likely due to a combination of environmental factors and the age of the algae. It may be possible to utilize freshwater algae as an assay tool for heavy metal concentrations as these algae are ubiquitous and some species tolerate wide variations in environmental conditions. (Auen-Wisconsin)
W77-02813

REX, A COMPUTER CONTROLLED ROBOT FOR IN SITU WATER QUALITY MONITORING,
Canada Centre for Inland Waters, Burlington (Ontario).
K. N. Birch.
American Society for Testing and Materials Special Technical Publication 573, p. 437-455, 1975. 6 fig., 1 tab., 8 ref.

Descriptors: *On-site data collections, *Water quality, *Monitoring, *Automatic control, Digital computers, Equipment, *Computer programs, Analytical techniques, *Pollutant identification.
Identifiers: Sensors, Robots.

A prototype computer controlled monitoring system using a relatively simple sensing head capable of performing a repertoire of analytical experiments in situ is described. The robot sensing head is the active portion of the remote station and includes all the electronic and mechanical hardware to decode and execute the commands from the computer. The sensing head was tested using an EAI 690 hybrid computer to simulate a central computer and telecommunications facility. The head consisted of a peristaltic pump, a servo positioned valve, an array of six electrodes (2 glass pH, 3 silver-silver chloride, and 1 gold micro-electrode) and a thermistor, along with buffer amplifiers and motor controllers to service these devices. A main feature is its design as a remote, computer peripheral, like a teletype, which understands up to 64 different commands, and which returns coded responses. Its in situ orientation makes the entire sensor head submersible and operable in depths to 100 m. A repertoire of programmed experiments showed how it could monitor temperature, pH, conductivity, dissolved oxygen, chloride ion, total carbon dioxide, total alkalinity, and a factor identified as 'other ions.' The system configuration is illustrated by a block diagram. Using the computer as the master control element is the major aspect of the system. (Auen-Wisconsin)
W77-02814

PROBLEMS IN THE MONITORING OF BIOMASS,
Canada Centre for Inland Waters, Burlington (Ontario).
N. H. F. Watson, G. F. Carpenter, and M. Munawar.
American Society for Testing and Materials, Special Technical Publication 573, p. 311-319, 1975. 4 fig., 1 tab., 11 ref.

Descriptors: *Measurement, *Biomass, *Sampling, Standing crops, Seston, Bioassay, Testing procedures, *Monitoring, Pollutant identification.

An effective approach to produce adequate biomass measures and which reports data in biomass as well as in numerical units is suggested. The method involves taking pairs of samples at each station, one as a vertical haul with a plankton net of sufficient diameter and length to ensure efficient straining of the water column; the second made to the same depth with an integrating water sampler. Integrated samples have been obtained to a 20 m depth. Measured portions of both samples are filtered on fiberglass (large zooplankton are removed from integrator filters), dried in a dessicator, and analyzed for ash-free dry weight or particulate carbon. A fraction of the integrator samples is passed through a sieve of the same mesh size as the plankton net, and each fraction dried to estimate net and nannoplankton concentrations. Biomass is expressed as concentrations (per cubic meter), although net and integrator dimensions allow calculation of areal abundance (per square meter) unit as well. Addition of the nannoplankton values to the plankton net biomass gives total biomass, and subtraction of net phytoplankton values from the plankton net value produces a zooplankton biomass value. This procedure assures that a sufficiently large sample is taken to overcome the effects of horizontal and vertical microdistribution of planktonic organisms and subsampling and analysis procedures allow absolute values of total biomass to be obtained. (Auen-Wisconsin)
W77-02818

HETEROGENEOUS SENSITIZED DECOMPOSITION OF WATER WITH SUNLIGHT,
Exxon Research and Engineering Co., Linden, N.J.
For primary bibliographic entry see Field 2K.
W77-02819

TROPHIC CLASSIFICATION OF LAKES USING LANDSAT-1 (ERTS-1) MULTISPECTRAL SCANNER DATA,
Environmental Research Lab., Corvallis, Oreg.
D. H. P. Boland.
EPA-600/3-76-037. April, 1976. 244 p. 38 fig., 33 tab., 211 ref., 18 append. NAS7-100 EZ-608770.

Descriptors: *Trophic level, *Remote sensing, *Satellites(Artificial), *Eutrophication, Photometry, Spectroscopy, Surveys, Statistical methods, Regression analysis, Lakes, Limnology, Great Lakes region, Pollutant identification, Classification.
Identifiers: *Lake classification, *Multispectral scanning, Cluster analysis, LANDSAT, Earth Resources Technology Satellite(ERTS).

LANDSAT-1 (ERTS-1) multispectral scanning data of 100 lakes in Minnesota, Wisconsin, Michigan and New York was evaluated. Principal components analysis was used to derive a multivariate trophic state index using six trophic indicators. Trophic state, defined in the study by lake position on the index, is predicted using multispectral scanning color regression statistical models. Utility of the scanning technique is most apparent when the seasonal contrasts between lakes at different points on the trophic scale are at maximum. It is concluded that remote sensing by earth satellite can be used to provide much useful data in trophic classification studies of lakes. Maximum benefit from the satellites can be derived through use of the data on their computer-compatible tapes in conjunction with automatic image processing techniques. While remote sensing is an effective tool for lake enumeration and lake surface area estimation, systematic time-series data gathering is difficult if not impossible because of excessive cloud cover on many passover dates. However, the method is useful as a supplemental data source in lake surveying, especially in situations involving large lakes and/or large numbers of lakes. (Harris-Wisconsin)
W77-02825

ENVIRONMENTAL INVENTORY AND ASSESSMENT OF NAVIGATION POOLS 24, 25, 26, UPPER MISSISSIPPI AND LOWER ILLINOIS RIVERS: AN AQUATIC ANALYSIS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Environmental Effects Lab.
W. K. Colbert, J. H. Johnson, J. E. Scott, and R. C. Solomon.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A 021 750, Price codes: A16 in paper copy, A01 in microfiche. Report No. Y-75-2, December 1975. 368 p. 33 fig., 35 tab., 4 maps, 95 ref., 10 append.

Descriptors: *Mississippi River, *Basic data collections, *Sampling, *Monitoring, *Water quality, Aquatic habitats, Environmental effects, Dams, Dikes, Dredging, Channel improvement, Operation and maintenance, Sediments, Turbidity, Phenols, Heavy metals, Nutrients, Temperature, Suspended solids, Alkalinity, Chemical oxygen demand, Benthos, Fish, Hydrogen ion concentration, Dissolved oxygen, Phytoplankton, Zooplankton, Chlorinated hydrocarbon pesticides, Navigation, Census.
Identifiers: *Illinois River, Navigation Pool 24, Navigation Pool 25, Navigation Pool 26.

Physical, chemical, and biological components of the aquatic system in Pools 24, 25, and 26 on the Upper Mississippi and Lower Illinois Rivers are described and compared at high and average flow periods, and the effects of operation and maintenance of the 9 ft channel on the aquatic ecosystems were assessed. Four major habitat types, main channel, side channel, river border areas, and areas downstream of dikes, were sampled, consisting of 70 sites at 19 transects. Water and sediment samples were collected for physical and chemical characterization. In situ measurements were made for dissolved oxygen, temperature, total alkalinity, pH, turbidity, and settleable solids. Laboratory analyses were made for chemical oxygen demand, phenols, heavy metals, selected nutrients, and chlorinated hydrocarbons. Benthic organisms, drift organisms, phytoplankton, and zooplankton were collected from both rivers, but fish were only collected from the Illinois River. Variance and mean comparison statistical analyses were used to test for differences between flow periods, rivers, and among habitats. The environmental impacts of operation and maintenance activities such as the stabilization of the water levels, destruction of benthic communities by dredging, and disposal of dredged material alongside the channel, was also discussed. (Luedtke-Wisconsin)
W77-02826

THE CAPACITY OF SALT MARSH VEGETATION TO MODIFY THE QUALITY OF ESTUARINE WATERS,
Rhode Island Univ., Kingston. Dept. of Plant and Soil Science.
For primary bibliographic entry see Field 2L.
W77-02830

PAPERS OF A SEMINAR ON EARLY WARNING SYSTEMS FOR TOXIC SUBSTANCES CONFERENCE REPORT,
Battelle Memorial Inst., Seattle, Wash
Available from the National Technical Information Service, Springfield, VA 22161 as PB-244 41 Price codes: A18 in paper copy, A01 in microfiche. Report No. EPA-560/1-75-003, July 1975. Seminar held on January 30-February 1, 1974, Seattle, Washington. 215 p. 68-01-2108.

scriptors: *Forecasting, *Toxicity, *Toxins, ublic health, *Environmental effects, pidemiology, Poisons, Simulation analysis, emical wastes, Projections, Industrial wastes, timating, Organic compounds, Indicators, ter quality, Analysis, Water pollution effects, aluation, Air pollution, Chemical industry, Dis-es, Industrial plants, Monitoring, Systems anal-s, Social aspects, Analytical techniques, Trace ments, Legal aspects, Legisltion, Human hology, Path of pollutants, Tracking hniques, Marking techniques, Tracers, Cost-nefit analysis, Decision making.
ntifiers: *Public health screening, *Early warn-systems, *Disease detection, *Disease screen-, *Priority ranking techniques, *Problem ntification and ranking, Evaluation systems, oritization systems, Research strategis, search methods, Toxic Substances Control Act, nsumer products and pollution, Radiolabeling, ratology, Cost-risk benefit analysis, Car-ogenic chemicals, Evaluation, Synthetic chemi-compounds, Environmental stressors, Public erest groups, Intuitive methods.

venteen papers are described, the proceedings a three-day seminar held early in 1974 to ex-ine some of the tools that currently exist for the ly identification, assessment and prioritization chemical substances which impact adversely on n or his environment. Participants represented ross section of organizations concerned with ly warning systems, including U. S. governn-nt agencies, private industry, research in-utes, universities, public interest groups, inter-ional agencies and various scientific ciplines. Hazardous and potentially-hazardous stances targeted for discussion included such ic metals, chemicals, and organic compounds mercury, lead, thalidomide, polychlorinated henyls, vinyl chlorides, fuel additives and ones. Various methodologies are discussed by ich toxic substance early warning systems can conceptualized, organized and utilized by in-stry, the government and the scientific sector. e relationships between water pollution effects d certain toxic substances are discussed in some pers. Public health screening, disease detec-n/disease screening and research strategies are vered. Specific epidemiologic effects are cussed in relation to certain agents and commu-ative pathways. (See W77-02836 thru W77-350) (Harris-Wisconsin).
77-02835

VIRONMENTAL IMPACT OF CHEMICALS,
w Chemical Co., Midland, Mich.
r primary bibliographic entry see Field 5G.
77-02836

VIRONMENTAL STRESSOR MATRIX STEM FOR EARLY WARNING,
ttelle Columbus Labs., Ohio.
L. Morrison.
Papers of a Seminar on Early Warning Systems Toxic Substances, held on January 30-Februa-1, 1974, at Battelle Research Center, Seattle, shington (EPA-560/1-75-003, July 1975), p. 175-. 7 fig., 3 tab., 8 ref.

scriptors: *Warning systems, *Analytical hniques, *Environmental effects, *Toxins, oxicity, Poisons, Public health, Monitoring, stems analysis, Hazards, Pollutant identifica-n, Path of pollutants, Chemicals.
ntifiers: *Evaluation systems, *Environmental essors, Disease detection, Public health screen-.

mework description is given of the three basic ments of an early warning system for identifica-n of toxic substances: surveillance, assessment d action. The system deals with environmental essors--the agents or factors of concern reduced their simplest terms or their most fundamental t. Examples are specific ketones, biphenyls, halides and oxides among the organic chemical compounds, along with noise, radiation, inhalants, foods and bacteria among the biological and physical environmental stress. An environmental stressor matrix traces an agent from its several sources along all its environmental pathways through various receptors to determine its effect on man. The environmental stressor matrix arrays stressors against sources, transport paths, and effects classifications. Surveillance is used to identify hazards by monitoring toxicants on the market, screening technical literature and comparing partial results at scientific meetings. Assessment attempts to verify that cause and effect relationships exist and a valid pollution chain diagram can be constructed to deal with a given stressor. As part of this step, quantitative modeling provides problem magnitude estimation. Finally, action implies corrective activities by industry, government and the scientific community. (See also W77-02835) (Harris-Wisconsin)
W77-02837

AN INCIDENT OF INDUSTRIALLY RELATED TOXIC PERIPHERAL NEUROPATHY,
National Inst. for Occupational Safety and Health, Cincinnati, Ohio.
B. F. Craft.
In: Papers of a Seminar on Early Warning Systems for Toxic Substances, held on January 30-February 1, 1974, at Battelle Research Center, Seattle, Washington (EPA-560/1-75-003, July 1975), p. 45-50. 4 ref.

Descriptors: *Industrial plants, *Epidemiology, Diseases, Human pathology, Toxicity, Toxins, Public health, Poisons, Monitoring, Chemicals.
Identifiers: *Methylbutyl ketone, *Peripheral neuropathy, Organic solvents(Chemicals).

The need for systems of early warning for toxicity is illustrated by early results of a study which showed that workers in a fabrics coating plant suffered from toxic peripheral neuropathy in which an organic solvent used in the printing operation--methylbutyl ketone (MBK)--was highly suspect as the etiological agent. Investigation revealed that other chemicals commonly known to produce a toxic neuropathy, such as hexane, acrylamide, trio-cresyl-phosphate and thallium, had not been in use in the plant for more than 10 years. The only significant change in operation was a substitution of MBK for another organic solvent. The first symptoms of the disease appeared 16 months after the substitution began on a partial basis. The use of a large number of chemical compounds in the plant, many for which there was little toxicological information, markedly complicated the assessment of the problem. Most such studies, furthermore, address a single-agent concept whereas workmen in industrial situations are often exposed to a variety of toxic compounds and other chemical agents whose synergistic or additive properties may well lead to hitherto-unknown effects. (See also W77-02835) (Harris-Wisconsin)
W77-02838

ESTABLISHING ENVIRONMENTAL PRIORITIES FOR SYNTHETIC ORGANIC CHEMICALS: FOCUSING ON THE NEXT PCBS,
Syracuse Univ. Research Corp., N. Y.
P. H. Howard.
In: Papers of a Seminar on Early Warning Systems for Toxic Substances, held on January 30-February 1, 1974, at Battelle Research Center, Seattle, Washington (EPA-560/1-75-003, July 1975), p. 51-65. 3 tab., 21 ref. 68-01-2202.

Descriptors: *Chemicals, *Toxins, *Toxicity, *Epidemiology, *Analytical techniques, Public health, Poisons, Polychlorinated biphenyls, Industrial production, Path of pollutants, Organic compounds, Priorities, Hazards.
Identifiers: *Priority-ranking techniques, Chlorinated napthalenes, Silicones, Fluorocarbons, Benzenecarboxylates, Chlorophenols.

Exact toxic effects are known for only a small proportion of the more than 9000 synthetic organic chemicals produced in commercial quantities in the United States. Because detailed studies to evaluate chronic toxicity costs an estimated $100,000 to $2000,000 per chemical, it is unlikely that all of the 300 to 500 new chemicals annually introduced for commercial use can receive more than a cursory evaluation. Therefore, a procedure is necessary whereby such testing can be priority-ranked for each chemical in terms of readily described or projected parameter. These would include environmental contamination potential, environmental stability and probable environmental distribution. Marketing information, for example, would provide insight into the probable route and destination in the environment of such contaminants as PCBs. Once the fate of such pollution were estimated, the stability parameter could be used to estimate the likely degradation or alteration mechanism and action time for the compound. Finally, an estimate could be made as to where the chemical might concentrate to dangerous levels in the environment. Examples of organic chemical hazard assessment are given for five groups of chemicals; chlorinated napthalenes, fluorocarbons, benzenepolycarboxylates and chlorophenols. (See also W77-02835) (Harris-Wisconsin)
W77-02839

1974 - A YEAR OF TRANSITION,
Environmental Protection Agency, Washington, D. C. Office of Toxic Substances.
For primary bibliographic entry see Field 5G.
W77-02840

REVIEW OF HEALTH/ENVIRONMENTAL SYSTEMS WITH POTENTIAL EARLY WARNING APPLICATIONS,
Battelle-Columbus Labs., Ohio.
T. J. Thomas, and J. E. Flinn.
In: Papers of a Seminar on Early Warning Systems for Toxic Substances, held on January 30-February 1, 1974, at Battelle Research Center, Seattle, Washington (EPA-560/1-75-003, July 1975), p. 128-150. 2 fig., 1 tab., 7 ref.

Descriptors: *Pollutant identification, *Chemicals, *Chemicals, *Chemical analysis, *Toxins, *Toxicity, *Indicators, *Public health, Analytical techniques, Analysis, Evaluation, Poisons.
Identifiers: *Problem identification and ranking, Prioritization systems, Evaluation systems.

Although a variety of methodologies have been developed which might be utilized to identify and priority-rank chemicals for their health and environmental effects, the Environmental Protection Agency's Office of Toxic Substances (OTS) finds that none of the methodologies have a frame of reference broad enough to select, assess and prioritize in a sufficiently comprehensive manner. However, many of the methodologies could represent important adjuncts to any OTS efforts to monitor public exposure to various chemicals. Three types of identification/ranking systems are: (1) those which provide information repositories for chemical toxicity data; (2) those designed to identify chemical substances before the time of general public exposure; and (3) those which provide post-exposure surveillance. Each of these can be further subscategorized as those which basically seek to identify new or unrecognized chemical stressors and those which seek to evaluate the hazard of a recognized stressor. Finally identification/ranking systems differ according to the way in which a candidate list of substances for evaluation is identified: (1) systematic literature scanning; (2) licensing; (3) test protocols; (4) expert panels; (5) data base sampling, accumulation or analysis; and (6) incident reports. Elements of these existing systems could be used to conceptualize three potential designs for a prioritization/classification scheme of sufficient comprehensiveness. (See also W77-02835) (Harris-Wisconsin)

W77-02841

A RESEARCH PROGRAM TO ACQUIRE AND ANALYZE INFORMATION ON CHEMICALS THAT IMPACT ON MAN AND HIS ENVIRONMENT,
Stanford Research Inst., Menlo Park, Calif.
A. A. McGee, and K. E. McCaleb.
In: Papers of a Seminar on Early Warning Systems for Toxic Substances, held on January 30-February 1, 1974, at Battelle Research Center, Seattle, Washington (EPA-560/1-75-003, July 1975), p. 151-153.

Descriptors: *Chemicals, *Public health, *Toxins, *Toxicity, Analytical techniques, Analysis, Evaluation, Poisons, Diseases, Pollutant identification.
Identifiers: *Carcinogenic chemicals, *Cancer-inducing substances, *Evaluation systems, Problem identification and ranking.

A data collection and analysis system for carcinogenic chemicals screening has been developed to aid the National Cancer Institute Carcinogenesis Program in selecting chemicals for testing. The system utilizes the current carcinogenic information data base which lists 3,200 chemicals categorized as intentional food additives, pesticide residues in food, proprietary drugs, prescription drugs, cosmetics, air pollutats, water pollutants, soaps and detergents and trade sales paints. These categories are subdivided into 900 product types which represent 18,000 chemical product combinations. Computer-readable data contain the following information: product name, quantity available for exposure, exposure routes (oral, dermal, respiratory and parenteral), exposure factor by route, CAS number and name, potency, (percentage of chemical) in each product, degree of uncertainty accociated with quantitative data and references to data sources. In addition to the information on the exposure categories, another data bank of 25,000 chemicals has been developed, drawn from 18 recognized information sources. Description is also given of a computerized chemical classification scheme which allows a node assignment to be made for each of the chemicals for which exposure estimates have been made. The availability of additional biological data in the future may make it possible to make informed guesses as to a molecule's carcinogenic potential based on the classification scheme. (See also W77-02835) (Harris-Wisconsin)
W77-02842

NATIONAL CANCER INSTITUTE PROGRAM OF CANCER SURVEILLANCE, EPIDEMIOLOGY AND END RESULTS REPORTING (SEER PROGRAM),
National Cancer Inst., Bethesda, Md. Biometry Branch.
J. L. Murray, and S. J. Cutler.
In: Papers of a Seminar on Early Warning Systems for Toxic Substances, held on January 30-February 1, 1974, at Battelle Research Center, Seattle, Washington (EPA-560/1-75-003, July 1975), p. 154-166. 5 fig., 2 tab., 4 ref.

Descriptors: *Epidemiology, *Public health, *Diseases, Toxins, Toxicity, Analysis, Analytical techniques, Poisons.
Identifiers: *Evaluation systems, Carcinogenic chemicals, Cancer-inducing substances.

The program is described through which information is provided on long-term trends in cancer occurrence in the United States, on occurrence variations in various population groups and geographic areas, new developments in diagnostic and treatment practices and changing trends in the effects of the disease among patients. The overall effort is focused on developing means to accurately assess cancer risks in groups and individuals and on evaluating the presence, extent and probable course of existing cancers. The SEER program involves two types of participants. One type consists of population-based tumor registries which attempt to obtain information on every newly-diagnosed cancer case and cancer-related deaths among populations of a defined size. The second type includes epidemiology research and training centers. Current SEER program participants include nine contract agencies whose study areas cover five whole states and parts of four others, with population bases of almost 19 million. According to present knowledge, many types of cancer are associated with environmental factors such as pollutants, and a majority of cancer deaths are attributable to them. (See also W77-02835) (Harris-Wisconsin)
W77-02843

A COST-RISK-BENEFIT ANALYSIS OF TOXIC SUBSTANCES,
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W77-02844

THE WORLD HEALTH ORGANIZATION'S ENVIRONMENTAL HEALTH CRITERIA AND AIR MONITORING PROGRAMS,
National Environmental Research Center, Research Triangle Park, N.C.
For primary bibliographic entry see Field 5G.
W77-02845

PUBLIC INTEREST METHODS FOR ASSESSING CHEMICAL HAZARDS,
Center for Science in the Public Interest, Washington, D.C.
For primary bibliographic entry see Field 5C.
W77-02846

EARLY-WARNING SYSTEM FOR TOXIC SUBSTANCES: HUMAN HEALTH ASPECTS,
National Environmental Research Center, Research Triangle Park, N.C.
A. V. Colucci, and P. E. Brubaker.
In: Papers of a Seminar on Early Warning Systems for Toxic Substances, held on January 30-February 1, 1974, at Battelle Research Center, Seattle, Washington (EPA-560/1-75-003, July 1975), p 5-12.

Descriptors: *Warning systems, *Forecasting, *Public health, *Epidemiology, *Human diseases, *Toxicity, *Toxins, *Pollutants, Social aspects, Human pathology, Poisons, Diseases.
Identifiers: *Public health screening, *Disease detection, *Disease screening.

Clinical medicine and epidemiology supported by environmental monitoring, biochemical and physiological research programs are all multidisciplinary elements of an approach needed to overcome difficulties of studying the human health effects of environmental pollutants. An overview of current early warning approaches shows that many existing epidemiological and clinical studies mounted by government and private industry have significant similarities. EPA's Community Health and Environmental Surveillance System and Community Pesticide Studies, Clinical Laboratory Evaluation and Assessment of Noxious Substances, Assessment of Cellular Toxicity and Interactions of Noxious Substances, National Environmental Banking System, along with programs sponsored by the Department of Health, Education and Welfare, the National Institute of Occupational Safety and Health, the Food and Drug Administration and the National Institute of Environmental Health Sciences, are currently used to predict changes in trends of existing pollutants. Such programs could be expanded into an early warning system by broadening the scope of pollutant monitoring and exposure and by improving health information gathering. One prototype of an early warning system is the integrated effort being developed by the Kaiser-Permanente Program now operative in fi western states, in which an average of 15 bas screening procedures are used. (See also W7 02835) (Harris-Wisconsin)
W77-02847

A LABORATORY MODEL ECOSYSTEM AS A ELEMENT IN EARLY-WARNING SYSTEM FOR TOXIC SUBSTANCES,
Illinois Univ. at Urbana-Champaign. Inst. for E vironmental Studies.
R. L. Metcalf.
In: Papers of a Seminar on Early Warning Syste for Toxic Substances, held on January 30-Febr ry 1, 1974, at Battelle Research Center, Seatt Washington (EPA-560/1-75-003, July 1975), p 6 81. 3 fig, 4 tab, 18 ref. EP-R-802022.

Descriptors: *Laboratory tests, *Tracki techniques, *Marking techniques, *Radiochemi analysis, *Toxins, *Toxicity, Analyti techniques, Tracers, Path of pollutan Biodegradation, Chromatography, Water pol tion, Poisons, Industrial wastes, Organic co pounds, Pesticides, Chemicals, Persistence.
Identifiers: Radioisotope labeling

A laboratory model ecosystem for evaluat micropollutant potentialities of a variety synthetic organic compounds, previou described by the author in other literature, off three major uses: (1) Screening new pesticides toxic effects to a number of organisms in the vironment, to determine degradation pathw and to characterize bioaccumulation biodegradability, (2) evaluating suitability of v ous pesticides for specific uses involving envir mental contamination; and (3) evaluating the po tion potential of various synthetic chemicals wh may enter the aquatic environment as trace c taminants. The model ecosystem is based on of radiolabeled molecules which permits tracing parent compounds and degradation produ through various organisms and food chains which facilitates quantitative determination amounts stored in various organisms. Instructi are given for construction of replicas of the labo tory model ecosystem, which involve use o glass aquarium containing a sloping shelf washed white sand, filled with water and see with plankton and sorghum seeds, the whole which is then subject to application by radiolabeled pesticides. Results and evaluati are given for laboratory tests of various pestici using the method. (See also W77-02835) (Har Wisconsin)
W77-02848

LANDSCAPE GEOCHEMISTRY AND VIRONMENTAL PROBLEMS,
Brock Univ., St. Catharines (Ontario). Dept Geological Sciences.
J. A. C. Fortescue.
In: Papers of a Seminar on Early Warning Syst for Toxic Substances, held on January 30-Feb ry 1, 1974, at Battelle Research Center, Sea Washington (EPA-560/1-75-003, July 1975), p 34. 11 fig, 21 ref.

Descriptors: *Monitoring, *Warning syste *Geochemistry, *Soil chemistry, *Soil analy *Public health, Trace elements, Analyt techniques, Toxicity, Water quality, Poisons, eases, Toxins.

Geochemistry, especially its lithospheric aspe might provide early warnings of toxic materia the environment, if research is applied in a us frame-of-reference. Three approach levels sh be categorized: a 'grand strategic' level which cludes broad generalizations upon w geochemistry is based; a 'strategic' level whic volves concepts associated with the landsc aspects of geochemistry, and a 'tactical' which is concerned only with the descriptio examples of applied landscape geochemistry

solving specific environmental problems. Reference is made to five examples of tactical-level investigations from which strategic and even grand-strategic generalizations might be drawn in application to toxicity studies: (1) distribution patterns of aluminum and lead in a forested landscape area; (2) effects on copper, zinc, lead and nickel uptakes by changes in the growth rate of certain forest trees brought about by an attack by the forest tent caterpillar during four growing seasons; (3) using lake sediment cores to detect human effects on the chemistry of the environment; (4) using stream sediments to detect natural and man-made variations in the chemistry of drainage basins; and (5) using stream sediments to locate an area characterized by molybdenum-induced copper deficiencies in cattle. (See also W77-02835) (Harris-Wisconsin)
W77-02849

LEGISLATION AND LAWS CONCERNING EARLY WARNING SYSTEMS FOR TOXIC SUBSTANCES,
Committee on Commerce (U. S. Senate).
For primary bibliographic entry see Field 5G.
W77-02850

CONTROL AND MONITOR INSTRUMENTATION FOR MUST WATER PROCESSING ELEMENT, FINAL REPORT,
Life Systems, Inc., Cleveland, Ohio.
G. G. See, K. K. Kacholia, and R. A. Wynveen.
Available from the National Technical Information Service, Springfield, VA 22161 as AD/A-018 156, Price codes: A07 in paper copy, A01 in microfiche. Report LSI ER-242-6, June 1975, 123 p, 37 fig, 32 tab, 22 ref. DADA 17-73-C-3163.

Descriptors: Treatment, *Waste treatment, *Water quality, *Waste water treatment, Management, Instrumentation, Monitoring, Water quality control.
Identifiers: *Medical Unit Self-Contained Trasportable, *MUST Water Processing Elements.

The evaluation program was primarily directed toward monitor instrumentation with secondary considerations given to its impact on control instrumentation. Areas of emphasis were survey of proper control and monitor instrumentation for the unit processes in the MUST WPE and the integrated system, conducting a trade-off analysis between spectator-analyzed performance data and various levels of automatic analysis, evaluating potable water quality monitoring requirements, and preparing a comparison of instrumentation alternatives. Suggestions which incorporate specific maintainability and reliability features into the WPE design include sensor redundancy, performance trend, and fault analysis, and design of components as Line Replaceable Units. (Chilton-ORNL)
W77-02878

ENVIRONMENTAL MEASUREMENTS OF AIR AND WATER QUALITY,
California Univ., Berkeley, Lawrence Berkeley Lab.
D. A. Mack.
(1975). 12 p, 6 tab, 2 fig, 17 ref.

Descriptors: *Water quality, Environment sanitation, *Water pollution, Analytical techniques, Measurement, *Monitoring, Spectrophotometry, Spectroscopy, *Pollutant identification, *Air pollution, Gas chromatography.

The paper lists the most prevalent air and water pollutants, notes typical levels encountered in background and urban concentrations and examines the methods presently employed in their analysis. Water quality analysis deals primarily with measurement of inorganic chemicals, metals, and organic chemicals, mainly pesticides. Atomic absorption spectrophotometry is identified as the chief method for measuring the metal content of water samples. Gas chromatography is routinely employed in pesticide analysis. Categories for improved water monitoring include improved ion-selective and gas membrane electrodes for a number of ions and gases, development of atomic absorption spectrophotometers with improved furnace techniques, and the use of an inductively coupled plasma in emission spectroscopy which may allow multi-element capability at ambient levels. (Chilton-ORNL)
W77-02880

THE STUDY OF THE EFFECT OF SEA ROUGHNESS ON THE REMOTE SENSING OF OIL POLLUTION BY THE ACTIVE METHOD, (IN RUSSIAN),
Leningrad Electrical Engineering Inst. (USSR).
V. V. Bogorodskii, M. A. Kropotkin, and T. Y. Sheveleva.
Okeanologiya 15(6), p 1112-1115, 1975.

Descriptors: *Oil pollution, *Remote sensing, *Pollutant identification.
Identifiers: Baltic Sea, Sea roughness.

Experimental data on the influence of sea roughness on the remote sensing of oil pollution by the laser location method are described. Investigations were carried out in the Baltic Sea at wind speeds of 3-15 m/s with a special electrical model. Dynamic time constant and contrast in the reflectance properties of oil pollution and pure water vs. wind speed were determined.--Copyright 1976, Biological Abstracts, Inc.
W77-02898

MEASUREMENTS OF POLYCHLORINATED BIPHENYL (PCB) IN WATER, SEDIMENTS, AND ORGANISMS OF TWO RIVERS IN HIROSHIMA PREFECTURE, (IN JAPANESE),
Hiroshima Univ. (Japan). Dept. of Fisheries; and Hiroshima Univ. (Japan). Faculty of Fisheries and Animal Husbandry.
H. Nakagawa, M. Kayama, and E. Ariyoshi.
J Fac Fish Anim Husb Hiroshima Univ. 14(2), p 253-259, 1975.

Descriptors: *Polychlorinated biphenyls, Sediments, Rivers, Asia, Measurement, Pollutant identification, Carp, Snails, Mullets, Distribution patterns, Path of pollutants.
Identifiers: Hiroshima, Japan, Mullet.

In the Ashida river and Hironishiohkawa of Hiroshima Prefecture, Japan, PCB water contents, sediments and aquatic organisms were detected. Not all the water samples contained PCB. PCB contents in fish (carp, mullet) and shellfish (snails) in the Ashida river reached 0.01 and 0.24 mg/kg. The PCB distribution pattern in different grain-sized sediments in both rivers indicates that PCB was distributed mostly in smaller grain-size sediments. Analysis of PCB in sediments should take special account of grain size.--Copyright 1976, Biological Abstracts, Inc.
W77-02899

IDENTIFICATION OF ACID-CONTAINING FRACTION OF ODORANTS OF NATURAL WATER, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Inst. of Colloidal Chemistry and Water.
L. A. Mel'nichenko, A. T. Pilipenko, and I. T. Goronovskii.
Gidrobiol Zh 11(6), p 86-90, 1975.

Descriptors: Acids, Algae, *Cyanophyta, *Eutrophication, *Organic acids, *Pollutant identification, *Gas chromatography, *Spectroscopy, Odor.
Identifiers: Aphanizomenon-flos-aquae, Fatty acids, Microcystis-aeruginosa.

The role of organic acids in the formation of persistent odors of natural water during the 'bloom' period of blue-green algae (predominantly Microcystis aeruginosa and Aphanizomenon flos-aquae) was investigated, and attempts were made to identify them by gas-chromatography and IR spectroscopy. The acid composition of natural waters during the 'bloom' period is extremely variable. Among the odorants were saturated and unsaturated fatty acids as components of complex volatile products.--Copyright 1976, Biological Abstracts, Inc.
W77-02901

STUDY OF A RELATIONSHIP BETWEEN CHEMICAL AND BACTERIOLOGICAL POLLUTION IN THE COASTAL ZONES, (IN FRENCH),
CEA Centre de Pierrelatte (France).
M. Archimbaud, and C. Trouve.
Water Research 10(3), p 225-229, 1976.

Descriptors: Water pollution, Bacteria, Chemicals, Coasts, *Pollutant identification, Environment, *Sampling.
Identifiers: Bacteriological studies, Chemical studies, Coastal zones, *France.

In the places and circumstances where samples were taken (France) there is a clear connection between chemical and bacteriological pollution. The zone of uncertainty still surrounding close to 1/3 of the samples can be reduced by a complementary study. This could pinpoint the meteorological and environmental parameters not yet studied. Bacteriological studies will still be needed after chemical studies are made. The latter will serve as a framework for preventive action.--Copyright 1976, Biological Abstracts, Inc.
W77-02903

EXPERIENCE IN CENTRALIZED COLLECTION, PROCESSING AND ANALYSIS OF SANITARY-HYGIENIC INFORMATION, (IN RUSSIAN),
Municipal Sanitary Epidemiology Station, Novokuznetsk (USSR).
O. I. Samuilo, Z. F. Karpova, and E. M. Deeva.
Gig Sanit 12, p 60-61, 1975.

Descriptors: *Information retrieval, Public health, *Sewage, *Air pollution, *Water pollution, *Industrial wastes, Monitoring, Data collections.

A punched card-type information retrieval system used for centralized collection and processing of information contained in reports of sanitary-hygienic investigations permits concentration of information on the sanitary state of urban objects (sewage, air and water pollution, industrial discharges, etc.), enabling prompt observation and monitoring of the state of the environment and activities of the sanitary-epidemiological stations.--Copyright 1976, Biological Abstracts, Inc.
W77-02908

METHODS OF BALANCING AND CALCULATING THE O2 BALANCE OF THE MIDDLE COURSE OF THE SAALE RIVER, (IN GERMAN),
S. J. Casper, and W. Schoenborn.
Limnologica 10(1), p 191-195, 1976.

Descriptors: *Oxygen requirements, Biochemical oxygen demand, Methodology, Measurement, Phytoplankton, Periphyton, Oxygen demand, Rivers, Pollutant identification.
Identifiers: *Saale River(E. Germany).

The biogenic (phytoplanktonic, periphytic) and physical (atmospheric) O2 production and the biochemical O2 requirement of 2 sections of the river, between Eichicht and Fischersdorf and between Rothenstein and Grossheringen (East Germany), were balanced. Physical O2 production

determines O2 balance. The O2 production of the phytoplankton became more significant and the percentage of the physical O2 production diminished as the lowland characteristics of the river became more pronounced. The Boehnke (1965) method proved practical in calculating changes in O2 content.--Copyright 1976. Biological Abstracts, Inc.
W77-02911

THE RATE OF MICROBIOLOGICAL OXIDATION OF METHANE DETERMINED WITH THE AID OF LABELED (CARBON-14) METHANE, (IN RUSSIAN),
For primary bibliographic entry see Field 5B.
W77-02962

RECORDS OF WELLS AND WATER QUALITY FOR THE GARBER-WELLINGTON AQUIFER, NORTHERN OKLAHOMA AND SOUTHERN LOGAN COUNTIES, OKLAHOMA,
Geological Survey, Oklahoma City, Okla. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-02974

MAPPING AND MEASURING LAND-COVER CHARACTERISTICS OF NEW RIVER BASIN, TENNESSEE, USING LANDSAT DIGITAL TAPES,
Geological Survey, Nashville, Tenn. Water Resources Div.
For primary bibliographic entry see Field 4A.
W77-02978

A WATER-QUALITY ASSESSMENT OF THE BURNHAM CREEK WATERSHED, POLK COUNTY, MINNESOTA,
Geological Survey, St. Paul, Minn. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-02979

AN APPRAISAL OF GROUND WATER FOR IRRIGATION IN THE APPLETON AREA, WEST-CENTRAL MINNESOTA,
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-02982

WATER-RESOURCES DATA FOR DEEP AQUIFERS ON EASTERN MONTANA,
Geological Survey, Helena, Mont. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-02985

INDEX TO WATER RESOURCES DATA FOR ILLINOIS,
Geological Survey, Champaign, Ill. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-02990

SAMPLING AND ANALYSIS OF STORM-WATER RUNOFF FROM URBAN AND SEMI-URBAN/RURAL WATERSHEDS - SYSTEMATIC DEVELOPMENT OF METHODOLOGIES IN PLANNING URBAN WATER RESOURCES FOR MEDIUM SIZE COMMUNITIES,
Purdue Univ., Lafayette, Ind. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 5B.
W77-02995

DETECTION OF PATHOGENIC LEPTOSPIRES IN EFFLUENT AND SEWAGE SLUDGE FROM LARGE PIGGERIES, (IN GERMAN),
Institutul Agronomic din Timisorara (Rumania). Faculty of Veterinary Medicine.
R. M. Minzat, and V. Tomescu.
Arch Exp Veterinaermed 29(4), p 557-562, 1975.

Descriptors: *Farm wastes, *Sewage effluents, *Water pollution sources, *Sludge, *Sewage bacteria, Hazards, Cultures, Sewage treatment, Pathogenic bacteria, Hogs, *Pollutant identification.
Identifiers: Leptospira pomona, Leptospira tarassovi, *Leptospires, Piggeries

Sewage effluent and sludge from the purification plant of 8 large piggeries was examined for the presence of pathogenic leptospires. 43.1% of effluent samples were contaminated with Leptospira pomona and L. tarassovi, and 33 strains of L. pomona and 3 mixed cultures of L. pomona and L. tarassovi were obtained. The isolated strains were pathogenic by experimental infection of guineapigs, rabbits and pregnant and non-pregnant sows. The average survival period of pathogenic leptospires in sewage effluent was 24-48 h, with a maximum of 96 h. Leptospires were killed within 24 h in decanted sludge, due to its strong acidity. Water pollution by pathogenic leptospires by way of untreated sewage from piggeries poses a risk of an epidemic among persons bathing in contaminated surface waters.
W77-02998

STANDARD TEST FISH DEVELOPMENT. PART I. FAT-HEAD MINNOWS (PIMEPHALES PROMELAS) AND GOLDFISH (CARASSIUS AURATUS) AS STANDARD FISH IN BIOASSAYS AND THEIR REACTION TO POTENTIAL REFERENCE TOXICANTS.
Minnesota Univ., St. Paul. Dept. of Entomology, Fisheries and Wildlife.
I. R. Adelman, and L. L. Smith, Jr.
Environmental Protection Agency, Ecological Research Series, Report EPA-600/3-76-061a, July 1976. 76 p, 23 tab, 4 fig, 24 ref

Descriptors: *Methodology, *Toxicity, *Bioassay, Fish, *Chromium, *Sodium chloride, Pesticides, Laboratory animals, *Laboratory tests, *Water pollution effects, Herbicides, Metals, Life cycles, Growth stage, Freshwater fish, *Minnows, *Pollutant identification.
Identifiers: *Goldfish, Guthion, Acute toxicity, *Fathead minnows, Hexavalent chromium, Pentachlorophenol, Reference toxicant

Fathead minnows and goldfish were compared for variability of LC50's with four toxicants as a means of determining their suitability as a standard bioassay fish. Acute bioassays with sodium chloride, penta-chlorophenol, hexavalent chromium and Guthion (R) were conducted with both species; and results were reported as toxicity curves as well as LC50's at various times. Both species showed similar variability of bioassay results. Bioassays of pentachlorophenol were conducted with both species to determine the effect of testing different sized fish at the same age or testing different aged fish. Size selection of fish within the ranges tested is unnecessary since differences in LC50's were small. Since age of fathead minnows did not affect the LC50's after 24 hours, use of younger fish would allow smaller bioassay chambers or more fish per chamber. Since goldfish could not be induced to complete a life cycle in the laboratory in less than one year, fathead minnows were superior as a standard species because of their smaller size and their utility in complete life cycle tests. On the basis of seven criteria, sodium chloride was superior for use as a reference toxicant with pentachlorophenol a close second choice. (See also W77-03003) (Katz)
W77-03002

STANDARD TEST FISH DEVELOPMENT. PART II: CHRONIC TOXICITY OF GUTHION TO THE FATHEAD MINNOW (PIMEPHALES PROMELAS REFINESQUE),
Minnesota Univ., St. Paul. Dept. of Entomology, Fisheries and Wildlife.
L. R. Adelman, and L. L. Smith, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 785, Price codes: A03 in paper copy, A01 in microfiche. Environmental Protection Agency, Ecological Research Series, Report EPA 600/3-76-061b, July, 1976. 22 p, 5 tab, 9 ref

Descriptors: *Bioassay, *Minnows, *Toxicity, *Mortality, Laboratory animals, Laboratory tests, *Water pollution effects, Freshwater fish, *Methodology, Water quality, Growth stages, Life cycles, Statistical methods, *Pollutant identification.
Identifiers: *Guthion(R), *Chronic toxicity, *Application factor, Maximum acceptable toxicant concentration, *Fathead minnows

Three chronic bioassays of Guthion(R) were conducted with fathead minnows. All tests were begun with eggs and the longest lasted 20 days after termination of spawning, a total of 250 days. Parameters measured were survival, growth, fecundity, and growth and survival of second generation fry and eggs. The most sensitive criteria for effect of the toxicant was fecundity. The maximum acceptable toxicant concentration was between 0.33 and 0.51 ug/liter Guthion(R), and the application factor was between .0017 and .0027 based on a soft water acute and a hard water chronic bioassay. (See also W77-03002) (Katz)
W77-03003

ANALYSIS AND GC-MS CHARACTERIZATION OF TOXAPHENE IN FISH AND WATER.
Fish and Wildlife Service, Columbia, Mo. Fish-Pesticide Research Lab.
D. I. Stalling, and J. N. Huckins.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 773, Price codes: A04 in paper copy, A01 in microfiche. Environmental Protection Agency, Ecological Research Series, Report EPA-600/3-76-076, August 1976. 42 p, 2 tab, 19 fig, 12 ref

Descriptors: *Brook trout, *Pesticides, *Insecticides, *Chlorinated hydrocarbon pesticides, Chromatography, *Analytical techniques, *Gas chromatography, *Mass spectrometry, Methodology, *Water quality, *Path of pollutants, *Pollutant identification.
Identifiers: *Toxaphene, Polyurethane foam, Gel permeation chromatography, Silicic acid chromatography, *Multicomponent toxaphene residues, Electron impact mass spectrometry, Chemical ionization

Sensitive methods for the detection and identification of toxaphene in water and fish were described. Polyurethane foam, gel permeation and silicic acid chromatography were utilized to permit accurate quantitation of multi-component toxaphene residues. A method for characterization of changes in isomer composition of toxaphene residues in fish was reported. The chemical composition of toxaphene was examined by electron impact and chemical ionization mass spectrometry. Chemical ionization gas chromatography-mass spectrometry was particularly applicable to the analysis and confirmation of toxaphene residues in environmental samples. (Katz)
W77-03005

CONTENT OF LITHIUM, URANIUM AND THORIUM IN MINERAL SPRINGS OF THE NAKHICHEVAN ASSR, (IN RUSSIAN),
A. I. Baeva, E. A. Mugalinskaya, and A. B. Akhundova
Izv. Adka Nauk Az Ssr Ser Biol Nauk 2, p 73-77, 1975.

Descriptors: *Mineral water, *Springs, *Solutes, *Bottom sediments, Chemical properties, *Pollutant identification.
Identifiers: Azerbaijan SSR, Balneology, *Lithium, Nakhichevan ASSR, *Thorium, *Uranium, USSR, Badamly, Sirba, Darydag.

Data are presented on the content of Li, U and Th in water and bottom deposits of 3 groups (Badamly, Sirba and Darydag) of mineral springs in the Nakhichevan ASSR (Azerbaijan SSR, USSR), showing that the content of these elements does not exceed the maximum allowable concentrations of soluble compounds of these elements in water. The mineral springs of the Darydag group had the maximum indices with respect to Li, U and Th. This is probably the cause of the high balneological effect (on humans) of the mineral water of these springs. Of the indicated elements, U has a relatively high tendency to accumulate in the bottom deposits of the springs.--Copyright 1976, Biological Abstracts, Inc.
W77-03016

THIN-LAYER CHROMATOGRAPHIC DETERMINATION OF ANTHIO AND BUTYPHOS IN WATER, (IN RUSSIAN),
Uzbekskii Nauchno-Issledovatelskii Institut Sanitarii, Gigieny i Profzabolevanii, Tashkent (USSR).
N. G. Popova, Yu. U. Khasanov, and T. B. Muzykantova.
Gig Sanit 6, p 50-51, 1975.

Descriptors: *Pesticides, *Defoliants, *Pollutant identification, *Separation techniques, *Water pollution sources, Testing, Sampling, *Chromatography, *Pesticide residues.
Identifiers: Anthio, Butyphos, USSR, Thin layer chromatography.

The methods for determining the pesticide anthio (active principle 0,0-dimethyl-S,W-methyl-(N-formycarbamoylmethyl)phosphorodithioate) and cotton defoliant butyphos (S,S,S,-tributyl phosphorotrithioate) are based on their separation and quantitative determination in a thin layer of silica gel. The zones of localization of both preparations are detected by a mixture of solutions of bromphenol blue and silver nitrate. The quantity of the preparations is established by a visual comparison of the staining intensity and spot sizes of the sample and standard solutions. The sensitivity of the determination is 0.05 mg/l.
W77-03022

A NEW TOWED UNDERWATER CAMERA SYSTEM FOR WIDE-RANGE BENTHIC SURVEYS,
Vienna Univ. (Austria). Lehrkanzel fuer Meeresbiologie.
For primary bibliographic entry see Field 7B.
W77-03030

CHLORINATED HYDROCARBONS IN CETACEANS,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
A. G. Taruski, C. E. Olney, and H. E. Winn.
Journal of the Fisheries Research Board of Canada, Vol. 32, p. 2205-2209, 1975. 2 tab, 27 ref.

Descriptors: *Path of pollutants, *Chlorinated hydrocarbon pesticides, *DDT, *Polychlorinated biphenyls, *Pesticide residues, *Dieldrin, Marine animals, Pesticides, Gas chromatography, Absorption, Mammals, *Pollutant identification.
Identifiers: *Cetaceans, *Whales, *Dolphins, *Chlordane.

DDT, PCB's, chlordane and dieldrin levels were measured in blubber of 18 cetaceans, including humpback, sperm, dense-beaked, Atlantic and Pacific pilot whales, and five species of dolphins. All had significant residue levels, ranging from 1.1 to 1023 ppm DDT (wet weight basis) and 0.7-147 ppm PCBs. These levels are high enough to justify efforts to reduce PCB contamination of the oceans and a continued ban on widespread use of DDT. (Katz)
W77-03033

DIELDRIN IN THE DIET OF CHANNEL CATFISH (ICTALURUS PUNCTATUS): UPTAKE AND EFFECT ON GROWTH,
National Marine Fisheries Service, Ann Arbor, Mich. Great Lakes Fishery Lab.
For primary bibliographic entry see Field 5C.
W77-03034

FLUORINE IN DRINKING WATER OF EASTERN SLOVAKIA, (IN RUSSIAN),
Univerzita Pavala Jozefa Safarika, Kosice (Czechoslovakia). Faculty of Medicine.
T. Petrilyakova, M. Mikulova, and P. Postishil.
Gig Sanit 4, p 82-84, 1975.

Descriptors: *Potable water, *Fluorine, Sedimentary rocks, Mineral water, Pollutant identification, Sampling.
Identifiers: *Czechoslovakia, Slovakia, Flysch.

In 1970-1972 541 drinking water samples from 284 populated areas of Eastern Slovakia were investigated; 44% of the samples contained F in a concentration of 0.00-0.10 mg/l, 37% had 0.15-0.45 mgF/l, and 16% had optimal F concentrations, 0.50-1.2 mg/l. The comparatively low F content in drinking waters is due to the face that the territory of Eastern Slovakia is composed primarily of flysch-type sedimentary rocks. More mineralized waters contain F in greater concentrations.
W77-03056

5B. Sources Of Pollution

MODELING OF ORGANIC COMPONENTS IN ALKALINE EFFLUENTS FROM KRAFT PULP PRODUCTION. I. STUDY OF LIGNIN DECOMPOSITION PRODUCTS (MODELIROVANIE ORGANICHESKIKH KOMPONENTOV SHCHELOKOSODERZHASHCHIKH STOCHNYKH VOD SUL'FATNO-TSELLYULOZNOGO PROIZVODSTVA. I. ISSLEDOVANIE PRODUKTOV RAZRUSHENIYA LIGNINA),
Vsesoyuznyi-Nauchnyi Planovii Otdel Bumazhnoi Promyshlennostn Moscow (USSR).
M. M. Krunchak, I. Ya. Stanyukovich, and T. M. Kroshilova.
Khimiya Drevesiny, No. 3, p 97-101, May/June, 1976. 3 fig, 8 ref, 2 tab.

Descriptors: *Pulp wastes, *Lignins, Degradation(Decomposition), Effluents, Pine trees, Separation techniques, Chromatography, Model studies, Waste water(Pollution), Water pollution sources, Wastes, Industrial wastes.
Identifiers: Dioxane lignin, Black liquors, Molecular weight, Kraft mills.

Dioxane lignin from pine wood was subjected to alkaline cooking under conditions simulating those used in the production of kraft pulp (24% NaOH, 20% sulfidity, 8:1 liquor ration at 170 C for 3 hr). The black liquor from the reaction was fractionated by extraction with various solvents at pH 11.5 to 1.5. A diagram of the fractionated procedure is given. All the fractions were analyzed by gel chromatography for the purpose of comparing the molecular weight distribution curves. The molecular weight distribution of the acid-insoluble fraction was similar to that of the starting dioxane lignin. The acid-soluble fractions were dispersed over a wide range of molecular weights. The amount of monomeric material was small. (See also W77-02586 and W77-02587) (Chern-IPC)
W77-02585

MODELING OF ORGANIC COMPONENTS IN ALKALINE EFFLUENTS FROM KRAFT PULP PRODUCTION. II. PHYSICOCHEMICAL PROPERTIES OF LIGNIN DECOMPOSITION PRODUCT (MODELIROVANIE ORGANICHESKIKH KOMPONENTOV SHCHELOKOSODERZHASHCHIKH STOCHNYKH VOD SUL'FATNO-TSELLYULOZNOGO PROIZVODSTVA. II. FIZIKO-KHIMICHESKAYA KHARAKTERISTIKA PRODUKOV RAZRUSHENIYA LIGNINA),
Vsesoyuznyi Nauchnyi Planovii Otdel Bumazhnoi Promyshlennost Moscow (USSR).
I. Ya. Stanyukovich, M. M. Krunchak, and T. M. Kroshilova.
Khimiya Drevesiny, No. 3, p 102-104, May/June, 1976. 2 fig, 6 ref, 2 tab.

Descriptors: *Pulp wastes, *Lignins, *Physicochemical properties, Effluents, Pine trees, Model studies, Water pollution sources, Wastes, Industrial wastes, Organic acids, Organic compounds.
Identifiers: Dioxane lignin, Functional groups, Ultraviolet spectra, Infrared spectra, Kraft mills, Black liquors.

The functional groups of the fractions obtained from the alkaline pulping of pine dioxane lignin under conditions simulating production of kraft pulp were analyzed by IR and UV methods. With decreasing pH the carboxyl group content in the acid-soluble fractions increased while the phenolic OH content decreased. All of the fractions had methoxyl group contents of 11-17%, except the ether-soluble fraction at pH 1.5 which had methoxyl content of 8.94%. The data are in agreement with literature data on the composition of the organic portion of black liquor. IR spectra are included. (See also W77-02585 and W77-02587) (Chern-IPC)
W77-02586

MODELING OF ORGANIC COMPONENTS IN ALKALINE EFFLUENTS FROM KRAFT PULP PRODUCTION. III. STUDY OF CARBOHYDRATE DECOMPOSITION PRODUCTS (MODELIROVANIE ORGANICHESKIKH KOMPONENTOV SHCHELOKOSODERZHASHCHIKH STOCHNYKH VOD SUL'FATNO-TSELLYULOZNOGO PROIZVODSTVA. III. IZUCHENIE PRODUCKTOV RAZRUSHENIYA UGLEVODNOI CHASTI DREVESINY),
Vsesoyuznyi Nauchnyi Planovii Otdel Bumazhnoi Promyshlennost Moscow (USSR).
M. M. Krunchak, I. Ya. Stanyukovich, and N. A. Ivanov.
Khimiya Drevesiny, No. 3, p 105-109, May/June, 1976. 3 fig, 9 ref, 1 tab.

Descriptors: *Pulp wastes, *Carbohydrates, Effluents, Organic acids, Lignins, Organic compounds, Lead, Salts, Wastes, Industrial wastes, Water pollution sources, Pine trees, Model studies.
Identifiers: Holocellulose, Kraft mills, Fatty acids, Acetic acid, Black liquors.

Holocellulose obtained in 70% yield from pinewood by the peracetic acid method was subjected to alkaline pulping under conditions simulating production of kraft pulp. The starting holocellulose consisted of 90% reducing substances and 0.9% lignin. Carbohydrate loss during holocellulose isolation was 10%. Diagrams are given for the separation of the organic components from the alkaline pulping, separation of the acid and hydroxy acid fraction, and separation of acid and hydroxy acids from the lead salts. Analysis of the organic substances from the pulping of holocellulose indicated that the nonvolatile compounds consisted of hydroxy and polyhydroxy acids and their lactones. The volatile acid fraction consisted of fatty acids, mostly acetic. (See also W77-02585 and W77-02586) (Chern-IPC)
W77-02587

GROUNDWATER POLLUTION BY WOOD WASTE DISPOSAL,
Oregon State Dept. of Environmental Quality, Salem.
H. R. Sweet, and R. H. Fetrow.
Ground Water, Vol. 13, No. 2, p 227-231, March/April, 1976.

Descriptors: *Groundwater, *Lumbering, *Water pollution, *Wood wastes, *Oregon, Bark, Leachate, Lignins, Color, Odor, Iron, Manganese, Water pollution sources, Waste disposal, Wastes, Industrial wastes, Solid wastes, Water wells, Water pollution effects, Forest management.
Identifiers: Willamette Valley(Ore), Tannins, Forest products industry.

Timber production and wood products industries in the Mid-Willamette Valley of Oregon annually dispose of about 547,000 tons of wood and bark wastes. Land storage or disposal of these wastes can result in the generation of significant volumes of leachate. Wood waste leachates are commonly characterized by lignin-tannin (measured as tannic acid), oxygen-demanding materials, color, and odor. In this study, lignin-tannin concentrations in the groundwater ranged as high as 7.5 mg/liter; iron and manganese were also shown to increase markedly relative to natural background concentrations, ranging as high as 13 mg/liter and 106 mg/liter, respectively. In August 1972 the area affected by the contaminated groundwater covered about 4 acres (1.6 hr) and extended nearly 1,000 ft (330 m) downhill from the disposal site. By late January 1973 the plume had migrated laterally to affect an area of about 15 acres (6 ha) while extending over 1,500 ft (460 m) downhill. The lateral migration is attributed to a seasonal change in the local flow system. At least eleven existing domestic water-supply wells have been rendered nonpotable by this pollution. (Witt-IPC)
W77-02591

GRAPHICAL INTERPRETATION OF WATER QUALITY DATA,
Mississippi State Univ., Mississippi State. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5A.
W77-02592

POLLUTION CONTROL IN INDIAN STEEL INDUSTRY,
Regional Engineering Coll., Rourkela (India) Dept. of Metallurgical Engineering.
R. C. Behera, and P. K. Senapaty.
Chemical Age of India, Vol 27, No 6, p 533-538, June, 1976. 6 tab, 23 ref.

Descriptors: *Industrial wastes, *Waste water treatment, *Steel, *Water pollution control, *Chemical wastes, Adsorption, Filtration, Aeration, Activated sludge, Flotation, Settling basins, Oxidation, Chemical precipitation, Neutralization, Reduction(Chemical), Suspended solids, Oil wastes, Phenols, Ammonia, Sodium, Iron, Aeration.
Identifiers: *Steel industry(India), *India, Thiocyanates, Thiosulfates, Tin, Chromates.

Sources of pollution in the Indian steel industry are reviewed along with methods for their control. Water pollution is caused by waste waters in the form of coke oven liquor, blast furnace cooling water, lubricating water from rolling mills, pickling liquor and wash water from electrolytic processes, and blast furnace gas scrubbing water. Methods currently being used to control these sources of water pollution include: adsorption on fly ash, filtration through plastic media, aeration, activated sludge treatment, flotation, settling, chemical neutralization, chemical oxidation and reduction, and lime precipitation. Pollutants controlled by these processes include: phenols, ammonia, thiocyanate, thiosulfate, oil emulsions, iron, chromates, tin, sodium, and suspended solids. (Kreager-FIRL)
W77-02605

CHEMICAL PULPING,
H. Norrestrom.
Pure and Applied Chemistry, Vol. 45, No. 3/4, p 181-186, 1976. 15 fig, 6 tab.

Descriptors: *Pulp and paper industry, *Waste water treatment, *Pulp wastes, *Biochemical oxygen demand, *Color, Effluents, Liquid wastes, Bleaching wastes, Chemical wastes, Neutralization, Suspended solids.

Various types of pulping processes are discussed in relation to the amount of wastes they generate. A typical 7-day biochemical oxygen demand figure for mechanical pulping is 25 kg/ton of pulp, with the bleaching operation contributing about 10 kg/ton. The amount of suspended solids in the effluent is normally between 20 and 30 kg/ton of pulp. Anywhere from 150-600 kg biochemical oxygen demand/ton of pulp is generated during chemical pulping. Normally, however, the spent liquor is collected, evaporated, and burned leading to at least a 95% reduction in biochemical oxygen demand discharge. The total biochemical oxygen demand of digester and evaporator condensates is about 10-12 kg/ton for kraft pulping and about 25 kg/ton for sulfite pulping. The total biochemical oxygen demand and color in effluent generated by the bleaching of softwood kraft pulp are about 15 and 170 kg/ton, respectively. The amount of color in effluents from kraft pulp bleaching and the biochemical oxygen demand value for the sulfite process is also slightly lower than that for kraft processes. Techniques for reducing pollution from pulping processes include oxygen bleaching and neutralization of sulfide condensates. (Kreager-FIRL)
W77-02606

IMPROVING DESIGN CRITERIA FOR SEPTIC TANK SYSTEMS,
Arkansas Univ., Fayetteville. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W77-02621

THE ENVIRONMENTAL FATE OF SELECTED POLY-NUCLEAR AROMATIC HYDROCARBONS,
Stanford Research Inst., Menlo Park, Calif.
S. B. Radding, T. Mill, C. W. Gould, D. H. Liw, and H. L. Johnson.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-250 948, Price codes: A07 in paper copy, A01 in microfiche. Report EPA-560/5-75-009, February, 1976, 122 p., 31 tab., 278 ref.

Descriptors: *Organic compounds, Environmental effects, *Reviews, *Bibliographies, *Public Health, *Thermal power plants, Chemicals, Biochemistry, Aquatic habitat, Ecology, *Toxicity, Algae, Bacteria, Invertebrates, Fish, Birds, Mammals, Aquatic organisms, Plants, Ozone.
Identifiers: *Polynuclear aromatic hydrocarbons, *Environmental persistence, *Benzopyrene, *Benzarthracene, *Phenanthraquinone.

A review of the recent literature on polynuclear (polycyclic) aromatic hydrocarbons (PAH) has been carried out for general information on PAH and specific details about six selected PAH. The sources, transport, chemical and physical transformation, structure-reactivity relationships, and biological (non-carcinogenic) properties have been reviewed with recommendations for further research. Information is derived from a review of 278 literature references. (Katz)
W77-02625

LITERATURE STUDY OF SELECTED POTENTIAL ENVIRONMENTAL CONTAMINANTS, ANTIMONY AND ITS COMPOUNDS,
Little (Arthur D.), Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5C.
W77-02629

ANALYSIS AND CONTROL OF THERMAL POLLUTION (178) TRAINING MANUAL,
Environmental Protection Agency, Cincinnati, Ohio. Office of Water Programs Operations.
J. R. Hyland
Available from the National Technical Information Service, Springfield, VA 22161 as PB-237 617, Price codes: A09 in paper copy, A01 in microfiche. Report EPA-430/1-74-010, August, 1974. 225 p, 90 fig, 200 ref.

Descriptors: *Temperature, *Thermal pollution, *Thermal stress, Thermal water, Water pollution effects, Water temperature, Aquatic environment, Cooling water, Biological effects, Monitoring, Bibliographies, Environmental effects, Environmental engineering.
Identifiers: *Training manual, *Training programs, Temperature prediction, Thermal pollution sources

Training course manual with 31 outlines concerning thermal pollution. Topics included are: sources of thermal pollution; effects on various organisms; physical and chemical changes from temperature; monitoring techniques; temperature prediction theories; heat dissipation; thermal pollution control methods. References are included on each topic. (Katz)
W77-02632

CADMIUM IN THE ENVIRONMENT - III: A TOXICOLOGICAL AND EPIDEMIOLOGICAL APPRAISAL,
Karolinska Institutet, Stockholm (Sweden).
L. T. Friberg, T. Kjellstrom, G. Nordberg, and M Piscator
Available from the National Technical Information Service, Springfield, VA 22161 as PB-246 115, Price codes: A10 in paper copy, A01 in microfiche. Report EPA-650/2-75-049, June, 1975. 110 p, 32 fig, 18 tab, 233 ref

Descriptors: *Review, *Bibliography, *Cadmium, *Water pollution, Biochemistry, Pathology, Physiology, *Toxicity, Metabolism, Biological properties, Analytical methods, Public health, Water pollution sources
Identifiers: Daily intake(Cadmium), *Cadmium analysis, Tissue analysis, Water analysis, Daily uptake, Cadmium excretion, Metallothionein, Pathological effects on humans, Itai-Itai.

A review is presented of the biomedical literature regarding cadmium. The major part of the material covered is published before 1973 to 1975. Subjects discussed are the problems of analysis in air, water and biological substances, possible routes of exposure, metabolism transport, distribution and excretion of cadmium. The effects of cadmium in biological systems is explored. (See also W74-12492 and W72-08062) (Katz)
W77-02633

THE MANUFACTURE AND USE OF SELECTED ALKYLTIN COMPOUNDS, TASK II,
Midwest Research Inst., Kansas City, Mo.
T. W. Lapp.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-251 819, Price codes: A07 in paper copy, A01 in microfiche. Final Report, April 2, 1976, EPA Contract No 68-01-2687, MRI Project No 3955-C. Report EPA 560/6-76-011, 122 p, 22 tab, 10 ref

Descriptors: Water pollution, Surveys, *Waste water treatment, *Industrial wastes, *Antifouling materials, Public health, Costs, *Economic feasibility, Industries, Prices, Metals, Chemical industries, Chemical wastes, Environmental effects, Economic impact, Catalysts.
Identifiers: Tin, *Organometallic compounds, *Tin organic compounds, Production methods,

ocides, Antifouling coatings, *Alkytin com-nds.

purposes of this study were to identify the duction methods, importation, exportation, use erns, and exposure to man and the environ-nt for selected alkyltin compounds from 1965 to 4. For this study, only organotin compounds ing alkyl groups with eight carbon atoms or attached to the tin were considered. Data for production methods included the specific cess, raw materials, annual production quanti-, major manufacturers, waste products, en-nmental management of process wastes, and er production data. Use patterns were tified and annual consumption data were com-d for each compound in the respective areas of zation. Major consumers in each use area were tified. Various possible methods for the expo-e of man and the environment to alkyltin com-nds were discussed and evaluated. Future duction quantities and areas of usage were esti-ed for the next 10 years. (Katz)
7-02634

DICAL AND BIOLOGIC EFFECTS OF EN-ONMENTAL POLLUTANTS. VANADIUM.
ional Research Council, Washington, D. C. mmittee on Biologic Effects of Atmospheric utants.
primary bibliographic entry see Field 5C.
7-02637

ECTS OF CARBON METABOLISM IN AMENTOUS MARINE FUNGI,
rida Atlantic Univ., Boca Raton. Dept. of logical Sciences.
primary bibliographic entry see Field 5C.
7-02638

VIRONMENTAL POLLUTION IN THE NEW AD BELT, (RANN UTILIZATION EX-RIENCE, CASE STUDY NO. 2),
souri Univ., Rolla.
. Wixson.
ilable from the National Technical Informa-Service, Springfield, VA 22161 as PB-247 246, e codes: A02 in paper copy, A01 in microfiche. ort NSF-RA-G-75-030, 1975. 23 p., 1 fig., 29

criptors: *Lead, *Metals, *Public Health, ne wastes, *Forests, *Timber management, utants, *Mining, Mills, *Mineral industry, system, *Deciduous forests, Forest soils, Mis-i.
tifiers: *New Lead Belts(Mo), Lead mining, ad mining industry, Southeastern Missouri, ad smelting, Heavy metal contamination.

rapid development of the lead mining industry e 'New Lead Belt' of southeastern Missouri ed serious concern as to the effects of lead ng activities on the surrounding virgin forest ystem. The objectives of this research are to mine the extent and causes and effects of y metal contamination from lead mining and lting on the surrounding forest, and to develop rmation for state and federal agencies so that opriate corrective action could be taken. This ect is a good example of a well-utilized arch program having significant value to in-ry, government, and to the public. The project y team served as a catalyst, bringing together stry and regulatory agencies in a cooperative rt to understand and solve a potentially serious lem. (Katz)
-02639

ESTIGATION OF SELECTED POTENTIAL IRONMENTAL CONTAMINANTS: LOETHERS,
cuse Univ. Research Corp., N. Y., Life nces Div.
primary bibliographic entry see Field 5C.

W77-02643

ADSORPTION OF COPPER AND COBALT FROM FRESH AND MARINE SYSTEMS,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
T. P. O'Connor, and D. R. Kester.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A021 602, Price codes: A02 in paper copy, A01 in microfiche. Geochimica et Cosmochimica Acta, Vol 39, p 1531-1543, 1975. 5 tab, 16 fig, 35 ref.

Descriptors: Water quality, *Metals, *Path of pollutants, *Copper, *Cobalt, Adsorption, Chemical properties, *Anion adsorption, Liquid wastes, Surfaces, Methodology, Acidity, Hydrogen ion concentration, *Illite, Ion exchange.
Identifiers: Solid phase concentration, Ionic strength, Ligands, Cobalt ions, Magnesium ions, Complexing ligands.

The adsorption of copper and cobalt from aqueous solution on to illite and other substrates has been studied as a function of pH, solution composition and solid phase concentration. The results are interpreted in terms of a model whereby the trace metals are adsorbed in exchange for surface bound H+ ions. Adsorption varies with solution ionic strength and the concentrations of complex forming ligands; both of these parameters tend to reduce the trace metal adsorption. The Cu2+ is two orders of magnitude more reactive toward solid surfaces than Co2+, which is consistent with the general reactivities of these two metal ions. It is also found that Mg2+ interferes with adsorption, presumably by competing with the trace metals for the surface sites. A quantitative model was developed which describes adsorption of these metals from natural waters ranging from river water to sea water as a function of pH, complexing ligands and magnesium activity. (Katz)
W77-02645

DISTRIBUTIONS AND NATURAL LEVELS OF RELATED METALS IN A TROPHIC PATHWAY,
Allied Chemical Corp., Idaho Falls, Idaho.
J. D. Lemons, and G. S. Kennington.
ERDA Idaho National Engineering Laboratory, Idaho Falls, Report ICP-1095, UC-11, June, 1976, 50 p, 6 tab, 10 fig, 77 ref.

Descriptors: *Metals, *Path of pollutants, Alkaline earth metals, Alkaline soils, *Lead, Soil contamination, Soil chemistry, Soil analysis, Soil science, *Path of pollutants, Physiology, Calciuum, *Calcium compounds, *Food chains, *Food habits, Spectroscopy, Trophic level.
Identifiers: *Trophic pathway, Stomach contents, Animal tissue.

Attempts were made to place the abundance of non-essential metals in a context of chemically similar metals of the same periodic table group. This information would be useful because the increased knowledge of metal pollution for herbivores would be provided. Data developed shows that non-essential and toxic metals are discriminated against relative to their chemically related nutritious metal, as the metals are transferred through the trophic pathway levels. (Katz)
W77-02646

MOLYBDENUM. A TOXCOLOGICAL APPRAISAL,
Karolinska Institute, Stockholm (Sweden). Dept. of Environmental Hygiene.
For primary bibliographic entry see Field 5C.
W77-02647

SUMMARY OF GROUND-WATER QUALITY IMPACTS OF URANIUM MINING AND MILLING IN THE GRANTS MINERAL BELT, NEW MEXICO,
Office of Radiation Programs, Las Vegas, Nev.
R. F. Kaufmann, G. G. Eadie, and C. R. Russell.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-247 282, Price codes: A05 in paper copy, A01 in microfiche. Technical Note, ORP/LV-75-4, August, 1975, 70 p, 9 tab, 11 fig, 34 ref.

Descriptors: *Groundwater, *Water pollution, *Hydrogeology, *Radioactivity, Waste disposal, *Uranium radioisotopes, *Waste water disposal, *Injection wells, Radioactive wastes, *Public health, Mining, *Mine wastes, *New Mexico.
Identifiers: *Uranium, Natural radioactivity, Radium, Uranium mining, Uranium milling, Tailings.

Ground-water contamination from uranium mining and milling results from the infiltration of radium-bearing mine, mill, and ion-exchange plant effluents. Radium, selenium, and nitrate were of most value as indicators of contamination. In recent years, mining has increased radium in mine effluents from several picocuries/liter (pCi/l) or less, to 100-150 pCi/l. the shallow aquifer in use in the vicinity of one mill was grossly contaminated with selenium, attributable to the mill tailings. Seepage from two other mill tailings ponds averaged 674 x 10 to the 6th power liters/year and, to date, has contributed an estimated 1.1 curies of radium to ground water. At one of these, an injection well was used to dispose of over 3400 x 10 to the 6th power liters of waste from 1960-1973. The wastes have not been properly monitored and have apparently migrated to more shallow potable aquifers. No adverse impacts on municipal water quality in Paguate, Bluewater, Grants, Milan, and Gallup were observed. No correlation was found between gross alpha greater than 15 pCi/l and radium-226 in excess of 5 pCi/l. (Katz)
W77-02648

PROCEEDINGS OF: NATIONAL CONFERENCE ON HEALTH, ENVIRONMENTAL EFFECTS, AND CONTROL TECHNOLOGY OF ENERGY USE.
Environmental Protection Agency, Washington, D. C. Office of Energy, Minerals and Industry.
For primary bibliographic entry see Field 5G.
W77-02649

MONITORING WESTERN ENERGY RESOURCE DEVELOPMENTS,
Environmental Monitoring and Support Lab., Las Vegas, Nev.
For primary bibliographic entry see Field 5G.
W77-02651

ATLANTIC OUTER CONTINENTAL SHELF ENERGY RESOURCES: ECONOMIC IMPLICATIONS FOR LONG ISLAND,
Cornell Univ. Agricultural Experiment Station, Ithaca, N. Y. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6G.
W77-02664

HISTORY OF OCEAN DUMPING IN THE GULF OF MEXICO,
Texas A and M Univ., College Station. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5E.
W77-02668

THE INTERACTION OF WAVES AND OIL SPILL,
Massachusetts Inst. of Tech., Cambridge. Dept. of Ocean Engineering.
R. J. Stewart.
Sea Grant Program Report No. MITSG-75-22, Index No. 75-322-Nwg, September 15, 1976. 203 p, 19 fig, 31 reg, 2 append. SG 04-5-158-1.

Descriptors: *Oil spills, *Oil pollution, *Ocean waves, *Interfaces, *Oil-water interfaces, Waves(Water).
Identifiers: Interfacial elasticity, *Mass transport, Monolayer problems, Asymptotic expansions, Sea Grant Program.

The combined effects of interfacial elasticity and multiple fluid layer geometrics upon the first order properties of surface waves are analyzed for application to the oil spill problem. The technique of matched asymptotic expansion is used in conjunction with a small amplitude assumption regarding the wave height. The theory of interfacial elasticity is briefly reviewed, and critical parameters are identified. Recommendations for further study of oil-water adsorption and mixed monolayer elasticities are developed. The second order mass transport properties are discussed in light of the first order solutions. It is concluded that the enormous potential of this system for significant variation in the first order properties makes further theoretical analysis highly dependent upon the availability of suitable experimental data to direct the theoretician. (NOAA)
W77-02669

SEDIMENT DISPERSAL PATTERNS AS CLUES TO PLACER-LIKE PLATINUM ACCUMULATION IN AND NEAR CHAGVAN BAY, ALASKA,
Wisconsin Univ., Madison. Marine Research Lab.
R. M. Owen, and J. R. Moore.
Sea Grant College Reprint No. WIS-SG-76-360 reprinted from: Proceedings of Offshore Technology Conference, Paper No. OTC 2453. May 1976. 14 p, 5 fig, 23 ref.

Descriptors: *Bays, *Alaska, *Sediments, *Placer mining, *Sediment transport, Provenance, Mining, Geochemistry, Metals, Resources, Dispersion, *Path of pollutants.
Identifiers: *Platinum, *Dispersal patterns, *Chagvan Bay(AK), Bering Sea, Mineral deposits.

The modern sediments of Chagvan Bay, Alaska contain zones of platinum enrichment which suggest an external source of platinum-host sediments. Two mathematical sediment tracing techniques, based on vector and multiple regression analyses of geochemical data, are used to determine the provenance and dispersal patterns of the bay deposits. Criteria for the selection of natural sediment tracers are presented, and the application of tracing techniques to the exploration for high latitude marine placers is discussed. (NOAA)
W77-02681

SCANNING THERMAL PLUMES,
Wisconsin Univ., Madison. Marine Studies Center.
For primary bibliographic entry see Field 5A.
W77-02682

EFFECTS OF BALED SOLID WASTE DISPOSAL IN THE MARINE ENVIRONMENT--A DESCRIPTIVE MODEL,
New Hampshire Univ., Durham. Dept. of Earth Sciences.
T. C. Loder.
Sea Grant Reprint No. UNH-SG-JR-100, 1975 Reprinted from ACS Symposium Series, No 18, Marine Chemistry in the Coastal Environment, 1975. 21 p, 5 fig, 6 tab, 40 ref. SG-2-35244. UNH No. 10230372.

Descriptors: *Waste disposal, *Water quality, *Environmental effects, Solid wastes, Municipal wastes, Mathematical models, *Path of pollutants.
Identifiers: *Marine environment, *Ocean dumping, Ocean environments, Baled wastes.

Compacted experimental bales of municipal solid waste (trash) have been immersed in seawater for several years and monitored for chemical, biological and physical changes. This experimental data is used to develop a descriptive and simple mathematical model for a commercial-sized disposal operation on the continental shelf or deep water off the shelf, handling the needs of a medium-sized coastal city. Factors considered in the model include: bale size; quantity per unit time; bale composition; packaging; areal extent of dump; depth; biota; current regime; decomposition rates; and the effects on water quality such as oxygen consumption, dissolved organics, nutrients, and hydrogen sulfide. The effects of a dumpsite on bottom water quality at the end of one year are calculated for a shallow and deep site for the 'average-most likely' dump and plausible extremes of the above variables. (NOAA)
W77-02683

PROBABILISTIC TRAJECTORY ASSESSMENTS FOR OFFSHORE OIL SPILLS IMPACTING LONG ISLAND,
Massachusetts Inst. of Tech., Cambridge.
P. J. Stewart, and J. W. Devannoy, III.
Report to Nassau-Suffolk Planning Board, Regional Marine Resources Council, November 15, 1974. 35 p, 9 fig.

Descriptors: *Oil spills, *Oil pollution, *Water pollution sources, *Winds, *Ocean currents, New England, *New York, Beaches, Coasts, Shores, Seasonal, Ocean circulation.
Identifiers: Outer Continental Shelf, *Long Island(NY), Nantucket Shoals, Wind fields, Trajectories

This study has shown that under the presumed current and wind fields, it is reasonable for Long Island to anticipate that some spills from the Nantucket Shoals region will beach upon her shores given a sufficient number of such events. In particular, it appears that the probability of a spill beaching on Long Island given that it originated on Nantucket Shoals is on the order of .05 in the summer and perhaps .01 or less in the winter. The times to shore for spills from this area appear to be in the thirty- to forty-day range on the average, and the minimum is around twenty days. These predictions are somewhat at variance with our previous results, but this can be explained by the differences in the wind field specifications. (NOAA)
W77-02689

MARYLAND UPLANDS NATURAL AREAS STUDY. VOL I: EASTERN SHORE,
Rogers and Golden, Inc., Philadelphia, Pa.
For primary bibliographic entry see Field 2L.
W77-02690

PERSISTENCE OF POLYCHLORINATED BIPHENYLS IN THE HARD-CLAM (MERCENARIA MERCENARIA) AND THE EFFECT UPON THE DISTRIBUTION OF THESE POLLUTANTS IN THE ESTUARINE ENVIRONMENT,
London Univ. (England). Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W77-02703

LEAD UPTAKE IN TWO MARINE PHYTOPLANKTON ORGANISMS,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 5C.
W77-02708

DDE AND LINDANE IN A LARGE-SCALE MODEL LENTIC ECOSYSTEM,
Purdue Univ., Lafayette, Ind. Dept. of Forestry.
For primary bibliographic entry see Field 5C.
W77-02713

COMPARISON OF 115M CD ACCUMULATION FROM SEDIMENTS AND SEA WATERS BY POLYCHAETE WORMS,
National Inst. of Radiological Sciences, Nakaminato (Japan). Marine Radio-Ecological Research Station.
T. Ueda, R. Nakamura, and Y. Suzuki.
Bulletin of the Japanese Society of Scientific Fisheries, Vol. 42(3), p 299-306, 1976. 2 tab., 5 fig, 20 ref.

Descriptors: *Metals, *Cadmium, *Marine pollution, *Path of pollutants, *Sediments, *Benthic organisms, Invertebrates, Annelids, Bottom sediments, Water quality, Sea water, Industrial wastes, Algae.
Identifiers: Concentration factors, 115m-Cd, Marine sediments, *Polychaete worms, Cadmium accumulation, Cadmium activity ratios.

To know the role played by marine sediments in influencing the fate of discharged metals, (1) the interaction of metals between sediments and deposit-feeder marine worms (Nereis japonica) and (2) uptake and excretion of metals by worms were examined by laboratory experiments using 115m-Cd. Worms directly in contact with 115m Cd-sediments accumulated 115m-Cd six times more rapidly than worms that were not in contact with the 115m-Cd sediments during the 8 days of experimentation. Comparing the concentration factor of 22 (from sea water) with accumulation from sediments, it was assumed that 115m-Cd in sediments would give the effect of 1/200 to the accumulation of 115m-Cd by worms in sea water to the accumulation of 115m-Cd. Further, to simulate these results close to that occurring in the natural ecosystem, the distribution of 115m-Cd in sea water, sediments and alga were also examined by means of a curve analysis of the distribution pattern by a three compartment model. It proved that the activity ratios of 115m-Cd were 9 for sediments and 21 for alga, which was similar to 22 for worms. (Katz)
W77-02717

BIOSYNTHESIS OF ORGANIC ARSENIC COMPOUNDS IN BROWN TROUT (SALMO TRUTTA),
Fisheries and Marine Service, St. John (Newfoundland). Biological Station.
For primary bibliographic entry see Field 5C.
W77-02719

AQUEOUS AMMONIA EQUILIBRIUM CALCULATIONS: EFFECTS OF PH AND TEMPERATURE,
Montana State Univ., Bozeman. Dept. of Chemistry.
For primary bibliographic entry see Field 5C.
W77-02720

STUDIES ON THE CHEMICAL BEHAVIOR OF 106-RU IN SEA WATER AND ITS UPTAKE BY MARINE ORGANISMS -I, ACCUMULATION AND EXCRETION OF 106-RU BY CLAM,
National Inst. of Radiological Science, Nakaminato (Japan). Marine Radio-Ecological Research Station.
For primary bibliographic entry see Field 5C.
W77-02722

SOME ENVIRONMENTAL AND TOXICOLOGICAL ASPECTS OF TRI-ARYL PHOSPHATE SYNTHETIC OIL,
For primary bibliographic entry see Field 5C.
W77-02724

CHLORINE-CONTAINING STABLE ORGANICS: NEW COMPOUNDS OF ENVIRONMENTAL CONCERN,
For primary bibliographic entry see Field 5C.
W77-02727

BIOACCUMULATION OF MERCURY IN MYOXOCEPHALUS QUADRICORNIS (L.) (TELEOSTEI, COTTIDAE) IN AN UNPOLLUTED AREA OF THE BALTIC,
Helsinki Univ. (Finland). Dept. of Environmental Science.
For primary bibliographic entry see Field 5C.
W77-02731

THE EFFECTIVENESS OF THE FINNISH ANTI-MERCURY MEASUREMENTS IN THE MODERATELY POLLUTED AREA OF HAMEENKYRO, (IN FINNISH),
Helsinki Univ. (Finland). Dept. of Environmental Science.
For primary bibliographic entry see Field 5C.
W77-02733

POLYHALOGENATED MONOTERPENES FROM THE RED ALGA, PLOCAMIUM CARTILAGINEUM,
Scripps Institution of Oceanography, LaJolla, Calif.
For primary bibliographic entry see Field 5C.
W77-02734

WINTER RUNOFF FROM AN URBAN CATCHMENT, (JANUARY TO MARCH 1974),
Nova Scotia Technical Coll., Halifax. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4C.
W77-02739

STORM WATER MANAGEMENT MODEL STUDY, VOLUME I.
MacLaren (James F.) Ltd., Toronto (Ontario); and Proctor and Redfern, Toronto (Ontario).
Canada-Ontario Agreement on the Great Lakes Water Quality, Research Report No 47, Environmental Protection Service, Environment Canada, Ottawa, Canada, September 1976, 295p., 100 fig., 32 tab, 123 ref. 73-5-10.

Descriptors: *Storm water, *Model studies, Canada, Watersheds(Basins), Water management(Applied), Data collections, Snowmelt, Runoff.
Identifiers: Storm Water Management Model(SWMM), Submodels.

Final results and conclusions of a study of storm water management models are described. Objectives were: to review and modify the U.S. Environmental Protection Agency's Storm Water Management Model (SWMM) for Canadian conditions; to select and modify a submodel for the simulation of quantity and quality of runoff resulting from snowmelt; to develop a data analysis submodel capable of extracting the SWMM meteorological data input from existing data banks; and, to select and modify a high-speed model for simulation of frequency of discharges and overflows, capable of using output from the data analysis submodel as input. This study has expanded the capabilities of the original SWMM. Methods of aggregating the properties of individual subcatchments into a single equivalent catchment are described which can lead to a considerable reduction in data preparation and computer processing time. A generalized quality model was developed, based on SWMM equations and using the simplications obtained in the aggregating techniques. Snowmelt quantity and quality models have been integrated with the SWMM. Methods of interfacing the SWMM and STORM (U.S. Army Corps of Engineers) models have been discussed and demonstrated, and a fully operational package of models, capable of simulation of all spects of storm water flow and quality, has been prepared for application to Canadian conditions. (See also W77-02744) (Environment Canada)
W77-02743

STORM WATER MANAGEMENT MODEL STUDY, VOLUME II.
MacLaren (James F.) Ltd., Toronto (Ontario); and Proctor and Redfern, Toronto (Ontario).
Canada-Ontario Agreement on the Great Lakes Water Quality, Research Report No 48, Environmental Protection Service, Environment Canada, Ottawa, Canada, September 1976, 148p., 8 fig., 34 tab, 127 ref. 73-5-10.

Descriptors: *Storm water, *Model studies, Snowmelt, Runoff, Research and development, Publications, Urban runoff, Water quality, Water quantity, Data collections, Waste water treatment.
Identifiers: *Storm Water Management Model(SWMM).

Supplementary technical material used in preparing the final report is described. Comparative analyses of six storm water routing models and four water quality models are described. Literature surveys are included for material dealing with urban runoff quality and snowmelt quantity and quality. Sources of data required for storm water modelling have been assessed, and study areas in Canada and the U.S. are described. A summary of the treatment processes available in the U.S. Environmental Protection Agency's Storm Water Management Model (SWMM) is given, and current literature and modifications to the treatment model are described. (See also W77-02743) (Environment Canada)
W77-02744

INSTRUMENTATION FOR FIELD STUDIES OF URBAN RUNOFF,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5A.
W77-02749

LEVELS OF ARSENIC AND SELENIUM IN THE GREAT LAKES REGION,
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 5A.
W77-02751

ASBESTIFORM FIBRE LEVELS IN LAKES SUPERIOR AND HURON,
Canada Centre for Inland Waters, Burlington (Ontario).
R. W. Durham, and T. Pang.
Inland Waters Directorate, Scientific Series No 67, 1976. 12 p, 5 fig, 5 tab, 9 ref.

Descriptors: *Asbestos, *Lake Superior, *Lake Huron, Lakes, Aquatic environment, Rivers, Mining, Sampling, Water analysis, Potable water, Great Lakes, Minnesota, Water pollution sources, Pollutant identification.
Identifiers: *Asbestiform fibres(Mineral), Concentrations, Silver Bay(Minn), Georgian Bay.

Asbestiform fiber concentrations from less than 0.1 million to 87.3 million per litre were measured in the open waters of Lake Superior during 1973. The most commonly occurring mineral fiber was chrysotile, although fibers of the amphibole mineral commingtonite were found in the western arm of Lake Superior near the Reserve Mining tailings dumping site at Silver Bay, Minnesota. The results suggest that the zone of influence of this dumping of asbestiform fibers does not extend far out into the lake and that it decreases from June through November. Rivers flowing into Lake Superior which were analyzed all had low chrysotile fiber concentrations below 8 million per litre, as did samples taken in spring 1974 from Lake Huron and Georgian Bay. (Environment Canada)
W77-02753

URBAN HYDROLOGICAL MODELING AND CATCHMENT RESEARCH IN CANADA,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 2A.
W77-02754

BEHAVIOUR OF OIL SPILLED IN ICE-COVERED RIVERS,
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
E. C. Chen, B. E. Keevil, and R. O. Ramseier.
Scientific Series No. 61, 1976, 34p., 4 app., 14 fig., 3 tab, 27 ref.

Descriptors: *Oil spills, *Ice, Ice cover, Rivers, Behavior, Oil-water interfaces, Drops(Fluids), River flow, Pipelines, Crude oil, Cold Regions, Canada, Path of pollutants, Oil pollution, Water pollution sources.
Identifiers: Ice-water interfaces, Oil slick, Thermal effects, Northern Canada.

Experiments were carried out in a cold room at -15C to investigate the behavior of Norman Wells crude oil spilled under freshwater ice. The oil, when released in water under ice, separates into droplets and rises to the ice-water interface where the oil drops coalesce to form a slick. The spreading of oil under ice is complicated by the coalescence of oil drops at the interface. In calm waters, the radius of the oil slick under ice is approximately proportional to 0.25 power of the elapsed time. In turbulent waters, however, the oil drops travel some distance, following the flow direction of water, before reaching the interface. Some of the small drops are suspended and dispersed in the water column. The slick formed at the ice-water interface does not adhere to the ice and contains some water-in-oil emulsions. If the oil is spilled under the ice and the ice continues to grow, the oil will be sandwiched between the ice layers. An oil lens trapped between the ice layers acts as an insulator and increases the temperature drop across the ice. The behavior of accidental oil spills in Canadian rivers was surveyed and analyzed. Observations of these accidental spills show that the oil, when spilled in a river, is quickly dispersed downstream. (Environment Canada)
W77-02760

SELECTION CRITERIA AND LABORATORY EVALUATION OF OIL SPILL SORBENTS.
Environmental Protection Service, Ottawa (Ontario).
For primary bibliographic entry see Field 5G.
W77-02769

NTA (NITRILOTRIACETIC ACID) - AN ECOLOGICAL APPRAISAL,
Environmental Protection Service, Ottawa (Ontario).
A. Prakash.
Economic and Technical Review Report EPS 3-WP-76-8, November 1976. 45 p, 1 fig, 85 ref, 2 tab, append.

Descriptors: *Nitrilotriacetic acid, Aquatic environment, Biodegradation, Detergents, Sewage treatment, Risks, Temperature, Projections, Potable water, Algae, Fish, Environmental effects, Water pollution effects, Ecology.
Identifiers: Receiving waters, Removal, NTA-metal complexes.

Environmental aspects of NTA are emphasized; an assessment is included of the ecological distribution and effects of NTA in the aquatic ecosystem, based on data from field monitoring and laboratory and pilot scale studies in Canada and the United States. Factors affecting biodegradability of NTA in the recipient environment, and current and projected environmental levels of NTA are discussed. General effects of increased amounts of NTA on aquatic ecosystems

and specific effects on algae, invertebrates and fish are reviewed. Adequate safety margins exist between anticipated NTA levels in the environment and those which are likely to produce deleterious ecological effects; and continued vigilance is recommended in certain special situations where a potential for cumulative build-up of NTA may exist. (Environment Canada)
W77-02770

EFFECTS OF PULPWOOD HARVESTING ON THE QUALITY OF STREAM WATERS OF FOREST CATCHMENTS REPRESENTING A LARGE AREA IN WESTERN ALBERTA, CANADA,
Northern Forest Research Center, Edmonton (Alberta).
T. Singh, Y. P. Kalra, and G. R. Hillman.
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No 113, p 21-27, 1974. 2 tab, 9 ref

Descriptors: *Forest watersheds, *Water quality, *Forest management, *Canada, Lumbering, Watersheds(Basins), Nutrients, Runoff, Lodgepole pine trees, On-site investigations, Data collections, Demonstration watersheds, Trees, Coniferous trees, Pulp and paper industry.
Identifiers: *Alberta(Canada).

The effects of pulpwood harvesting on water quality are being studied by the Canadian Forestry Service. The study reported was conducted from 11 May to 28 June 1973 on a pulp lease area (7770 sq km) in Western Alberta. Thirteen catchments in three working circles were selected, seven represented the undisturbed condition whereas the remaining six had been partially logged during the past ten years. Analysis of variance showed no significant difference in the concentration of cations between treated and untreated catchments. The long-term effects of pulpwood harvesting were not significantly different from the natural erosion of nutrients from undisturbed forests. (See also W77-02771) (Humphreys-ISWS)
W77-02774

THE EFFECT OF AGRICULTURE ON THE SURROUNDINGS OF LAKE BALATON,
University of Agriculture, Keszthely (Hungary).
A. Toth, and Z. Fekete.
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment; Proceedings of Paris Symposium, September 1974. International Association of Hydrological Sciences Publication No. 113, 36-39, 1974. 1 fig, 4 tab, 3 ref.

Descriptors: *Water pollution sources, *Lakes, *Agriculture, Water quality, Shallow water, Soil erosion, Farm management, Farms, Cultivation, Cultivated lands.
Identifiers: *Hungary, *Lake Balaton(Hungary).

The influence of agriculture on man's environment in the basin of Lake Balaton was studied. It was ascertained that the pollution of the lake stems primarily from soil erosion, and that deep ploughing and contour cultivation diminish erosion and pollution to a large extent. Plant nutrient losses were calculated from measurements taken over a 10-year period. The polluting effects of fertilizing and plant protection were also examined. It was noted that animal husbandry pollutes the waters; water plants in the lake quickly multiply due to the influence of sewage; soil pollution in the health resorts is rendered harmless by a high humus content. (See also W77-02771) (Humphreys-ISWS)
W77-02776

THE ROLE OF FOREST STANDS IN THE CONTROL OF EROSION PROCESSES AND OTHER NEGATIVE NATURAL PHENOMENA,
For primary bibliographic entry see Field 4D.
W77-02785

A SIMPLE DISPERSION MODEL OF THE MEAN CONCENTRATION FIELD IN THE WESTERN AND CENTRAL BASINS OF LAKE ERIE,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 2H
W77-02795

OBSERVATIONS OF THE KELVIN-HELMHOLTZ INSTABILITY IN LABORATORY MODELS AND FIELD EXAMPLES OF THERMAL PLUMES,
Old Dominion Univ., Norfolk, Va. School of Engineering.
For primary bibliographic entry see Field 2H.
W77-02796

CONTAMINANTS IN THE NEW YORK BIGHT,
Manhattan Coll., Bronx, N.Y. Environmental Engineering and Science Program
J. A. Mueller, A. R. Anderson, and J. S. Jeris
Journal of the Water Pollution Control Federation, Vol 48, No 10, p 2309-2326, October 1976. 12 fig, 6 tab, 40 ref. NOAA-04-4-002-35.

Descriptors: *Water pollution sources, *Pollutants, *Wastes, *New York, *Waste disposal, Water pollution, Water quality, Waste water(Pollution), Organic matter, Fallout, Drainage effects, Surface water, Drainage, Coasts, Runoff, Gaging stations, Urban runoff, Surface runoff, Ecosystems, Gages, Heavy metals, Municipal wastes
Identifiers: *Coastal zones, *New York Bight, Barge dumps, Microbes, Coastal waters, Dredge spoils.

This paper presented an estimate of the location and magnitude of contaminant inputs into the New York Bight, indicated their relative importance, and identified data gaps. Four sources of contaminant inputs were evaluated in the study: barge dumps, atmospheric fallout as direct Bight inputs, wastewater, and runoff as coastal inputs to waters ultimately draining to the Bight. For each source, in addition to flow or volume, recent data on 23 separate contaminants obtained from numerous agencies were used to estimate the inputs of solids, organic matter, nutrients, heavy metals, and microbes. A summary of the contribution by source and location was presented as well as an estimate of the annual or seasonal variability for selected sources. To evaluate the significance of the mass loads generated in the study, they were compared with an estimate of the background mass loads entering the Bight as a result of a net current across the ocean boundaries. (Henley-ISWS)
W77-02799

A BENTHIC SURVEY OF FLAT CREEK AND THE SALT RIVER NEAR THAYNE, WYOMING.
Environmental Protection Agency, Denver, Colo. Technical Support Branch.
For primary bibliographic entry see Field 5C.
W77-02807

SPATIAL AND TEMPORAL VARIATIONS IN THE INTERSTITIAL WATER CHEMISTRY OF CHESAPEAKE BAY SEDIMENTS,
Johns Hopkins Univ., Baltimore, Md.
For primary bibliographic entry see Field 5C.
W77-02808

ON THE HABITABILITY OF MARS, AN APPROACH TO PLANETARY ECOSYNTHESIS.
Ames Research Center, Moffett Field, Calif
For primary bibliographic entry see Field 6G.
W77-02810

THE EFFECT OF DISSOLVED ORGANIC MATTER IN SEA WATER ON THE UPTAKE OF MIXED INDIVIDUAL HYDROCARBONS AND NUMBER 2 FUEL OIL BY A MARINE FILTER-FEEDING BIVALVE (MERCENARIA MERCENARIA).
Rhode Island Univ., Kingston. Graduate School of Oceanography
For primary bibliographic entry see Field 5C.
W77-02817

CHEMICAL AND PHOTOCHEMICAL TRANSFORMATION OF SELECTED PESTICIDES IN AQUATIC SYSTEMS,
Environmental Research Lab., Athens, Ga.
For primary bibliographic entry see Field 5C.
W77-02822

ANALYSIS OF EMISSIONS FROM OUTBOARD TWO CYCLE MARINE ENGINES,
Michigan Univ., Ann Arbor.
W. J. Weber, Jr, D. E. Cole, and J. C. Posner.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-242 174
Price codes: A12 in paper copy, A01 in microfiche
Report No. EPA-670/2-75-061, June 1975. 249 p, 120 fig, 37 tab, 34 ref, 2 append. 1BB038 R 801799

Descriptors: *Water pollution sources, Boating, Lakes, *Analytical techniques, Gasoline, Toxicity, Oil wastes, Fishkill, Laboratory tests, Organic compounds, Pollutant identification.
Identifiers: *Outboard engines, Two cycle engines, Crankcase oil, Emissions, Exhaust

The outboard engine was assessed as a source of environmental pollution with particular emphasis on the aquatic ecosystem in small lake systems. A wide variety of two-stroke engines were run under load conditions and both condensable and non-condensable emissions analyzed in this laboratory-based study. The effect of a 'tune up' on emissions was also examined and found to have little impact. Crankcase drainage constituted a small fraction of the total hydrocarbons emitted, and consisted of 10-15 times more oil than the fuel mixture. Exhaust products expected to be condensable in water-column constituted less than 10% of the fuel in all cases, and were usually considerably less. The major portion of the water condensable aromatics had an evaporation half-life of approximately 11 days, though there was a small portion of non-volatile hydrocarbon fraction which was not removed by evaporation. Analytical methods for field study were developed, and the toxicity of both condensed exhaust and individual gasoline compounds to goldfish were determined. This research is one part of a three part study, the other two parts of which involved field studies. (Luedtke-Wisconsin)
W77-02823

TEMPORAL VARIATIONS IN THE PHOSPHORUS CONTENT OF A NORTHERN DYSTROPHIC LAKE,
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
For primary bibliographic entry see Field 5C.
W77-02824

HYDRODYNAMICS-DISPERSION STUDIES IN STORM SEWERS.
Rutgers - The State Univ., New Brunswick, N.J. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 8B.
W77-02827

LANDSCAPE GEOCHEMISTRY AND ENVIRONMENTAL PROBLEMS,
Brock Univ., St. Catharines (Ontario). Dept. of Geological Sciences.
For primary bibliographic entry see Field 5A.
W77-02849

BACTERIAL DEGRADATION OF POLYCHLORINATED BIPHENYLS II. RATE STUDIES,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5C.
W77-02851

DISTRIBUTION OF WATER AND IONS IN SOILS IRRIGATED AND FERTILIZED FROM A TRICKLE SOURCE,
Agricultural Research Organization, Bet Dagan (Israel). Div. of Soil Chemistry and Plant Nutrition.
For primary bibliographic entry see Field 3F.
W77-02855

A COMPARATIVE WATER QUALITY ANALYSIS OF SELECTED RECREATION LAKES AND STREAMS IN THE WHITE MOUNTAINS OF ARIZONA,
Arizona Univ., Tucson. School of Renewable Natural Resources.
J. G. Utter.
Master of Science Thesis, 1975. 151 p, 32 fig, 26 tab, 67 ref.

Descriptors: *Recreation wastes, *Water pollution sources, *Waste disposal, *Camping, Recreation facilities, Water quality, *Arizona, Streams, Lakes, Bacteria, Environment, Water pollution, Streptococcus.
Identifiers: *White Mountains area(Ariz).

This study examines the water quality issue in relation to selected recreation lakes and streams in the White Mountains of Arizona. Four major parameters of water quality were investigated: physical environment factors, chemical nutrient concentrations, fecal bacterial contamination, and visitor use effects. Results indicate intensive recreational use and development may be accompanied by decreased water quality. The research lake exhibiting the most intensive use and development showed significantly greater fecal bacterial contamination in the concentrated use area. Management considerations developed in this report are directed toward assisting recreation land managers in recognizing and preventing present and future water quality problems. (Jamail-Arizona)
W77-02866

THE POTENTIAL TRACE METAL CONTAMINATION OF WATER RESOURCES THROUGH THE DISPOSAL OF FLY ASH,
Notre Dame Univ., Ind. Dept. of Civil Engineering.
T. L. Theis.
In: 2nd National Conference on Complete Water Reuse held in Chicago, Illinois, May 4-8, 1975, 19 p, 5 fig, 3 tab, 27 ref.

Descriptors: *Environmental effects, Water resources, *Fly ash, Heavy metals, Water pollution, Water pollution sources, *Metals, Aquatic life, Trace elements.

In an effort to obtain data on trace metals, several fly ashes were gathered from power generating stations and subjected to a micro-elemental analysis. Considerable variability was found but the arsenic and cadmium contents of virtually al the fly ashes were consistently 5-100 times natural abundances while in at least one case all the other metals showed this same degree of excess. The report is concerned with the contact between fly ash and water supplies. Data on te pH, dissolved oxygen, and heavy metal leachate effects on aquatic resources are presented. (Chilton-ORNL)
W77-02873

THE LOCATION OF INDUSTRIAL WATER USERS AND AIR POLLUTION: AN OVERLOOKED RELATIONSHIP,
Argonne National Lab., Ill. Energy and Environmental Systems Div.
D. J. Santini.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-246 670, Price codes: A10 in paper copy, A01 in microfiche. Report NSF-RA-E-75-044 272, June 1975. 11 p, 5 tab, 1 fig. NSF and RANN Nos. AG-352 and GI 32989A2.

Descriptors: *Environmental effects, *Water utilization, *Air pollution, *Industrial water, Industrial plants, Sites, Economic feasibility, Water pollution sources.

The use of water in the production process is responsible for a great deal of concentration of industrial air pollution. For a policy of dispersal of water using air polluting industry to be achievable, the results of the study imply that either adequate water supplies must be provided at alternative locations or water use must be eliminated from the production pocess by technological means such as air cooling and that these means must be economically feasible. The report also indicates that even if these conditions are met that industries are still likely to choose urban locations. (Chilton-ORNL)
W77-02877

EFFECT OF IRRIGATION ON SOME PROPERTIES OF SOUTHERN CHERNOZEMS, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Soil Science.
For primary bibliographic entry see Field 2G.
W77-02889

QUALITATIVE COMPOSITION OF IRRIGATION WATER AND SUSPENDED LOAD OF THE ORDZHONIKIDZE IRRIGATION SYSTEM, (IN RUSSIAN),
T. A. Mamedova.
Izv Akad Nauk Az SSR Ser Biol Nauk 2, p 83-88, 1975.

Descriptors: *Irrigation water, *Irrigation systems, *Nutrients, *Suspended load, Irrigation, Soils, Nitrates, Ammonia, Nitrogen compounds, Nitrogen, Phosphorus, Potassium, Humus.
Identifiers: Ordzhonikidze, USSR, Mil'skii steppe, Kura-Araks, Azerbaijan SSR.

Data are presented from a study of the irrigation waters and their effect on the soils under conditions of the Ordzhonikidze irrigation system of the Mil'skii steppe of the Kura-Araks lowland in the Azerbaijan SSR (USSR). The water of the system are rich in nutrient elements (nitrate and ammonia N, P, humus, K). The suspended load contains 0.21-0.49% total P, and is also rich in available nutrient elements.--Copyright 1976, Biological Abstracts, Inc.
W77-02890

MEASUREMENTS OF POLYCHLORINATED BIPHENYL (PCB) IN WATER, SEDIMENTS, AND ORGANISMS OF TWO RIVERS IN HIROSHIMA PREFECTURE, (IN JAPANESE),
Hiroshima Univ. (Japan). Dept. of Fisheries; and Hiroshima Univ. (Japan). Faculty of Fisheries and Animal Husbandry.
For primary bibliographic entry see Field 5A.
W77-02899

STUDY OF A RELATIONSHIP BETWEEN CHEMICAL AND BACTERIOLOGICAL POLLUTION IN THE COASTAL ZONES, (IN FRENCH),
CEA Centre de Pierrelatte (France).
For primary bibliographic entry see Field 5A.
W77-02903

YEASTS AND FUNGI IN MARINE ENVIRONMENTS, (IN FRENCH),
Centre Hospitalo-Universitaire-Poitiers (France). Lab. of Bacteriology.
J. Briscou.
Bull Soc Fr Mycol Med 4(2), p 159-162, 1975.

Descriptors: *Yeasts, *Marine fungi, Sediments, Mollusks, Fish, Plankton, Coasts, Water pollution sources, Human infection.
Identifiers: *Candida, *Debaryomyces, *Saccharomyces.

The distribution and composition of fungal populations in coastal marine waters are reviewed. They are found in sediments, molluscs, fish intestines and plankton. Plankton serve as a vector for fungi. Common fungi are Candida, Saccharomyces and Debaryomyces. A major health problem is the large number of human intestinal fungi found in polluted coastal waters. Vaginal infections from Candida in women bathing in such waters are increasingly common. Better pollution control and caution by bathers are suggested.--Copyright 1976, Biological Abstracts, Inc.
W77-02904

THE GENERAL CHARACTER OF THE WATER OF THE MIDDLE OF THE SAALE RIVER, (IN GERMAN),
D. Floessner.
Limnologica 10(1), p 45-55, 1976.

Descriptors: Rivers, *Water pollution, Sediments, Oxygen, Organic matter, Seasonal, Biochemical oxygen demand, *Oxygen requirements.
Identifiers: Autotrophic population, *Saale River(East Germany), *Saprobity index.

The saprobity index at 6 locations along the river, from Eichicht to Grossheringen (East Germany), was calculated from Feb.-Oct. 1971 at 2 and 4 wk intervals, based on the number and frequency of saprobic organisms, sediment consumption, O2 balance and relative pollution level. This 5 km section of the river is borderline oligo--to beta--mesosaprobic. Biological activity is characterized by a high percentage of autotrophic organisms. An increase in suspended organic matter drastically reduced the autotrophic population during the winter. The calculated BSB5 (biochemical O2 requirement for 5 days per liter of water) was 600 kg O2 for the section between Rothenstein and Maua and 750 kg O2 for the Stoeben-Grossheringen section.--Copyright 1976, Biological Abstracts, Inc.
W77-02910

METHODS OF BALANCING AND CALCULATING THE O2 BALANCE OF THE MIDDLE COURSE OF THE SAALE RIVER, (IN GERMAN),
For primary bibliographic entry see Field 5A.
W77-02911

AMINO ACID AND FRACTIONAL COMPOSITION OF PROTEIN OF THE VEGETATIVE MASS OF CORN AT DIFFERENT LEVELS OF MINERAL NUTRITION AND WATER SUPPLY, (IN RUSSIAN),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Kormov, Moscow (USSR).
For primary bibliographic entry see Field 2I.
W77-02918

CARBOHYDRATES AND NITROGENEOUS COMPOUNDS IN A NUMBER OF HIGHER AQUATIC PLANTS AND DYNAMICS OF THEIR CONTENT DURING VEGETATION, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
For primary bibliographic entry see Field 2I.
W77-02919

EFFECTS OF FLOOD FLOWS ON WATER QUALITY OF TIOGA-HAMMOND LAKES; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
M. S. Dortch.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A029 143, Price codes: A03 in paper copy, A01 in microfiche. Technical Report H-76-11, August 1976. 42 p, 5 fig, 15 pl.

Descriptors: *Acidic water, *Alkaline water, *Floods, *Hydraulic models, *Unsteady flow, Water analysis, *Flow, Water quality, *Pennsylvania, Model studies.
Identifiers: *Hammond Lake(Penn), *Tioga Lake(Penn).

The physical model investigation was conducted to estimate the dilution and dispersion of acidic and alkaline substances within Tioga-Hammond Lakes as a result of flood flows and to determine the concentration of these substances in the outflow during drawdown. The model, consisted of Tioga and Hammond Lakes, the connecting channel of the dual reservoir system, Hammond outlet works, and the flood control intakes of Tioga outlet works. The model simulated density variations and stratifications expected to exist in the prototype due to temperature differences and reproduced the unsteady inflow and outflow hydrographs for various size floods. Concentrations of fluorescent dyes simulated the acidic and alkaline substances; water samples were collected and analyzed to determine the dilution and dispersion of the dyes throughout the lakes and in the outflow from the lakes. The expected concentrations of acidic and alkaline substances existing in the two lakes after flood inflows and drawdown and in the outflow during drawdown are presented for three flood conditions. The results provide information for estimating water quality for similar flood conditions within and downstream of the project and guidance for limiting adverse quality during drawdown. (WES)
W77-02931

BIOLOGICALLY ACTIVE SUBSTANCES OF THE SILT DEPOSITS OF DNIEPER RESERVOIRS, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytyt Hidrobiologii.
V. V. Arendarchuk.
Gidrobiol Zh 11(3), p 59-62, 1975.

Descriptors: *Organic compounds, *Silts, *Bottom sediments, *Phenol, Reservoir silting, Reservoirs, Wheat, Plant growth, Waste, Water pollution sources.
Identifiers: Coleoptiles, *Dnieper reservoirs(USSR), *Indoles, USSR.

Bottom Silt deposits in the Dnieper sequence of reservoirs (USSR) contain biologically active substances of an indole and phenol nature. The free indole compounds readily pass from the silt into water. The indole compounds found in the silt deposits stimulated the growth of wheat coleoptiles.--Copyright 1976, Biological Abstracts, Inc.
W77-02934

COOPER RIVER REDIVERSION PROJECT, BUSHY PARK WATER SUPPLY TESTS; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02939

FALLS LAKE WATER-QUALITY STUDY; HYDRAULIC LABORATORY INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
B. Loftis, and D. C. Fontane.
Available from the National Technical Information Service, Springfield, Va 22161. Price codes A05 in paper copy, A01 in microfiche. Miscellaneous Paper H-76-6, April 1976. 76 p, 2 tab, 13 pl, 10 ref, append

Descriptors: *Dissolved oxygen, *Intake structures, *Water quality, *Water temperature, *North Carolina, Lakes
Identifiers: Falls Lake(NC)

A mathematical model was used to simulate the thermal and dissolved oxygen (D.O.) content of the proposed Falls Lake project and to evaluate the adequacy of the proposed multilevel intake structure for satisfying downstream temperature and D.O. objectives. The study indicated that proper operation of the proposed impoundment would result in satisfying the temperature objective. Low D.O. content values are predicted, reflecting the quality of water available for release through the intake structure and outlet works. However, reaeration of flow released through the multilevel outlet works should be sufficient to increase the D.O. content of the downstream release up to or above the desired minimum level of 5 mg/l. (WES)
W77-02941

FEASIBILITY OF MONITORING FLOW PATTERNS AND SEDIMENT AND POLLUTANT DISPERSION OF WATER BODIES WITH 24-CHANNEL SPECTRAL DATA,
Army Engineer Waterways Experiment Station, Vicksburg, Miss
M. H. Smith
Available from the National Technical Information Service, Springfield, Va. 22161 as AD/A-025 333, Price codes A04 in paper copy, A01 in microfiche. Miscellaneous Paper M-76-10, May 1976. 55 p, 24 fig, 3 tab, 2 pl, 6 ref.

Descriptors: *Chesapeake Bay, *Data processing, Pollutants, *Remote sensing, Sediments, *Sediment transport, *Monitoring, Feasibility studies, *Path of pollutants, Data collections, *Dispersion.

The primary objective of this research effort was to develop data-handling procedures to transform digital data collected by a Bendix 24-channel airborne sensor into radiance values and to produce images free of skew and reflectance geometry distortion. Data collected over the Chesapeake Bay area on 26 October 1972 and 22 April 1973 at approximately 3200 m and later recorded on computer-compatible tapes (CCT) were studied. Special attention was focused on data from the Rappahannock River. The scanner system, including the mechanics, optics, and electronics, is described with an explanation of data formatting on the NASA-generated CCT and the formatting required by existing U.S. Army Engineer Waterways Experiment Station (WES) computer software and programs to handle remotely sensed data, specifically ERTS or LANDSAT CCT data. (WES)
W77-02946

B. EVERETT JORDAN LAKE WATER-QUALITY STUDY,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
B. Loftis, P. E. Saunders, and J. L. Grace, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A021 682, Price codes: A09 in paper copy, A01 in microfiche. Technical Report H-76-3, February 1976. 193 p, 7 fig, 1 tab, 22 plates, 3 append, 19 ref.

Descriptors: *Hydraulic models, *Mathematical models, *Stratified flow, *Water quality, *Dissolved oxygen, Lakes, *North Carolina
Identifiers: *B. Everett Jordan Lake(NC), New Hope River(NC), Haw River(NC).

Physical and mathematical models were used to investigate the hydrodynamics of stratified flow within B. Everett Jordan Lake, to predict the temperature and dissolved oxygen (D.O.) regimes of the lake immediately upstream of the dam, and to estimate the temperature and D.O. content of the release. The hydrodynamic phenomena in the lake were significantly influenced by lake geometry, two highway crossings in the New Hope arm of the lake, and the relatively large quantity of flow contributed by the Haw River. The two highway crossings essentially divide the New Hope arm of the lake into three pools. The lower pool is influenced primarily by the Haw River, and the upper pool is influenced only by the New Hope River. The results of the numerical simulations indicate that the multilevel outlet works can be operated such that downstream temperature and D.O. objectives can be satisfied. (WES)
W77-02954

THE RATE OF MICROBIOLOGICAL OXIDATION OF METHANE DETERMINED WITH THE AID OF LABELED (CARBON-14) METHANE, (IN RUSSIAN),
S. S. Belyaev, K. S. Laurinavichus, and M. V. Ivanov
Mikrobiologiya 44(3), p. 542-545, 1975.

Descriptors: *Oxidation, *Microorganisms, *Methane, *Carbon, *Microbiology, Chemical reactions, Lakes, Carbon dioxide, Microbial degradation, Pollutant identification
Identifiers: Carbon-14, *Mari Lakes(USSR).

About 75-90% of the C from methane (CH4) oxidized by microorganisms was found in CO2, the remainder was incorporated into the microbial cells. The rate of microbiological methane oxidation in the water of the Mari Lakes was 6.4 x 10-3-464.4 x 10-3cm3CH /l per day.--Copyright 1976, Biological Abstracts, Inc.
W77-02962

GRAYS HARBOR ESTUARY, WASHINGTON, REPORT 6, 45-FT MSL (40-FT MLLW) NAVIGATION CHANNEL IMPROVEMENT STUDIES; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss
For primary bibliographic entry see Field 8B.
W77-02963

AN OILSPILL RISK ANALYSIS FOR THE NORTH ATLANTIC OUTER CONTINENTAL SHELF LEASE AREA,
Geological Survey, Reston, Va. Water Resources Div., and Department of the Interior, Washington, D. C. Office of Policy Analysis
R. A. Smith, J. R. Slack, and R. K. Davis
Open-file report 76-620, 1976. 50 p, 10 fig, 5 tab, 12 ref, append.

Descriptors: *Oil industry, *Atlantic Ocean, *Drilling, *Oil spills, *Environmental effects, Forecasting, Evaluation, Ecology, Path of pollutants, Continental shelf, Northeast U. S.
Identifiers: *Outer Continental Shelf

The Federal Government has proposed to lease 1,172,795 acres of Outer Continental Shelf (OCS)

ands on Georges Bank off the New England Coast or oil and gas development. Estimated recovera-le petroleum resources for the proposed 206 tract ale area range from 180 to 650 million barrels. Contingent upon actual discovery of this quantity f oil, production is expected to span a period of bout 20 years. An oilspill risk analysis was con-ucted to determine relative environmental azards of developing oil in the North Atlantic Outer Continental Shelf lease area. The study nalyzed probability of spill occurrence, likely ath of pollutants from spills, and locations in pace and time of recreational and biological esources likely to be vulnerable. These results are ombined to yield estimates of the overall oilspill isk associated with development of the lease area. (Woodard-USGS)
W77-02972

A RECONNAISSANCE OF THE EFFECTS OF A FOREST FIRE ON WATER QUALITY IN KINGS CANYON NATIONAL PARK, CALIFORNIA,
Geological Survey, Menlo Park, Calif. Water Resources Div.
R. J. Hoffman, and R. F. Ferreira.
Open-file report 76-497, August 1976. 17 p, 7 fig, 1 tab, 16 ref.

Descriptors: *Environmental effects, *Forest fires, *Water quality, *Surface waters, Data collections, Sampling, Water analysis, Chemical analysis, Water pollution, Dissolved solids, Nutrients, Trace elements, Carbon, Sediment transport, Algae, National parks, *California.
Identifiers: *Kings Canyon National Park(Calif), Benthic invertebrates.

Following two forest fires in the Roaring River drainage basin, Kings Canyon National Park, Calif., water samples were collected from May to July 1974 to determine water-quality changes resulting from the fires. Field measurements included alkalinity, pH, specific conductance, temperature, and discharge. Samples were analyzed in the laboratory for major dissolved chemical constituents, selected plant nutrients, trace metals, suspended sediment, total organic carbon, and seston. Periphytic algae and benthic invertebrate samples were collected. A noticeable increase in the concentration of nitrogen was found in Roaring River immediately downstream from the Moraine Creek fire. The increase in the concentration of inorganic nitrogen compounds, however, was not great enough to pose a serious threat to the aquatic ecosystem. High total organic nitrogen concentrations may have been due, in part, to factors other than the effect of fire. The results of other water-quality measurements were typical of dilute Sierra Nevada streams and indicate that Roaring River was not adversely affected by the fires. (Woodard-USGS)
W77-02973

PRELIMINARY RESULTS OF PREIMPOUNDMENT WATER-QUALITY STUDIES IN THE TIOGA RIVER BASIN, PENNSYLVANIA AND NEW YORK,
Geological Survey, Harrisburg, Pa. Water Resources Div.
J. R. Ward.
Available from the National Technical Information Service, Springfield, VA as ADA-029 315, Price codes: A05 in paper copy, A01 in microfiche. Water-Resources Investigations 76-66, July 1976. 39 p, 23 fig, 6 tab, 13 ref.

Descriptors: *Path of pollutants, *Acid mine water, *Water quality, *Pre-impoundment, Reservoirs, Pennsylvania, New York, Streams, Data collections, Mine drainage, Strip mines, Chemical analysis.
Identifiers: *Tioga River basin(Pa-NY).

Three impoundments have been proposed for the Tioga study area in Pennsylvania and New York. Two of the reservoirs, Tioga and Hammond Lakes, are presently under construction and will be completed in 1977. Cowanesque Lake is in the planning stages and will be started in the near future. The Tioga River and its major tributaries were sampled monthly from September 1973 to May 1975. Water quality in the Tioga River is degraded by acid-mine drainage entering the stream near Blossburg from both strip- and deep-mined areas. The stream supports few species of aquatic life from Blossburg to its confluence with Crooked Creek. Alkaline water of tributaries Mill Creek, Crooked Creek, and the Cowanesque River counteract the acidity carried downstream from Blossburg, and the water quality of the Tioga River gradually improves, supporting a more diversified population of fish and aquatic life. All of the streams in the Tioga River basin carry nutrients sufficient for algae blooms. Dissolved solids range from very high to moderately high throughout the basin. The Tioga River has high concentrations of sulfate and heavy metals, particularly iron and manganese. Dissolved oxygen was usually above 80 percent saturation and never dropped below 7.0 milligrams per liter throughout the basin. Relationships between selected water-quality parameters have been developed for the sampling stations throughout the basin. Downstream trends were also examined. (Woodard-USGS)
W77-02977

A WATER-QUALITY ASSESSMENT OF THE BURNHAM CREEK WATERSHED, POLK COUNTY, MINNESOTA,
Geological Survey, St. Paul, Minn. Water Resources Div.
M. R. Have.
Open-file report 75-647, 1975. 15 p, 2 fig, 4 tab, 12 ref.

Descriptors: *Water quality, *Surface waters, *Chemical analysis, *Water pollution sources, Evaluation, Water properties, Water analysis, Nitrates, Nitrites, Phosphates, Bacteria, Coliforms, Pesticides, Benthic fauna, *Minnesota, Path of pollutants.
Identifiers: Polk County(Minn), *Burnham Creek watershed(Minn).

A water-quality assessment of the Burnham Creek watershed, Polk County, Minn., was made in May 1975. Surface waters were calcium magnesium bicarbonate types with 0.11 mg/liter or less of nitrite plus nitrate nitrogen and 0.10 mg/liter or less of total phosphorous. Fecal coliform bacteria concentrations were between 3 and 720 colonies per 100 milliliters and fecal Streptococci concentrations ranged between 19 and 1600 colonies per 100 milliliters. Pesticide concentrations were low in the stream bottom materials, but an increasing trend was apparent in the downstream direction. The benthic community was dominated by blackfly larvae. (Woodard-USGS)
W77-02979

CONVECTIVE MODEL OF LONGITUDINAL DISPERSION,
Geological Survey, Jackson, Miss. Water Resources Div.
R. S. McQuivey, and T. N. Keefer.
Proceedings of ASCE, Journal of the Hydraulics Division, Vol 102, No HY10, Paper 12478, p 1409-1424, October 1976. 1 fig, 1 tab, 17 ref, append.

Descriptors: *Dispersion, *Path of pollutants, *Turbulence, *Streamflow, *Model studies, Analytical techniques, Evaluation.
Identifiers: Linear systems.

Longitudinal dispersion is the spreading out of substances along a stream or channel due to velocity differences and turbulent diffusion. Rather than moving downstream as a slug, the transported quantity is distributed along the length of the stream, some parts traveling faster and some slower than the mean-flow velocity. A model which describes the dispersion process accurately is essential to the understanding and managing of water pollution problems. Longitudinal dispersion can be successfully modeled as a purely convective linear process for approximately one-sixth of the time required to reach the diffusive period. A system-response function developed from the log-law velocity profile may be used up to this limit. The remaining five-sixths of the convective period is modeled as a chain of linear convective systems. Data sets from four flume tests and three natural rivers are used to verify the use of the convective response function. Excellent results are obtained in all cases. (Woodard-USGS)
W77-02988

DISPERSION--MISSISSIPPI RIVER BELOW BATON ROUGE, LA.,
Geological Survey, Jackson, Miss. Water Resources Div.
R. S. McQuivey, and T. N. Keefer.
Proceedings of ASCE, Journal of the Hydraulics Division, Vol 102, No HY10, Paper 12490, p 1425-1437, October 1976. 11 fig, 1 tab, 8 ref, append.

Descriptors: *Dispersion, *Path of pollutants, *Mississippi River, *Louisiana, *Model studies, Statistical methods, Numerical analysis, Turbulence, Water pollution, Mixing.

Dispersion is the spreading out of particles along a stream or channel due to velocity differences and turbulent diffusion. A knowledge of the dispersion characteristics of streams and rivers is essential to the understanding and managing of water pollution problems. The data described and analyzed consist of concentration-versus-time and concentration-versus-distance relations measured downstream of an instantaneous point source injection in the Mississippi River at Baton Rouge, La. The objectives of the study are to: (1) Document the initial mixing characteristics of the tracer photographically; (2) determine the longitudinal dispersion coefficient; and (3) verify a simple convective model of the dispersion process. Measurements of longitudinal dispersion and lateral and vertical mixing were made in the Mississippi River at a flow of 795,000 cfs. The results show that the longitudinal dispersion coefficient for the 179-mile reach from Baton Rouge to Point a la Hache, La., was approx 7,500 sq ft/sec. Vertical mixing was accomplished in about 50 miles. A numerical model based on a particular solution of the convection equation was used to aid in data collection. The model provides an accurate simulation of the dispersion process over the entire length of the study reach. (Woodard-USGS)
W77-02989

SAMPLING AND ANALYSIS OF STORM-WATER RUNOFF FROM URBAN AND SEMI-URBAN/RURAL WATERSHEDS - SYSTEMATIC DEVELOPMENT OF METHODOLOGIES IN PLANNING URBAN WATER RESOURCES FOR MEDIUM SIZE COMMUNITIES,
Purdue Univ., Lafayette, Ind. Dept. of Environmental Engineering.
F. T. R. McElroy, III, C. F. Mattox, D. W. Hartman, and J. M. Bell.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 080, Price codes: A06 in paper copy, A01 in microfiche. Purdue University Water Resources Research Center, Technical Report No 64, September 1976. 102 p, 12 fig, 43 tab, 41 ref. (Partial Completion Report). OWRT C-3277(3713)(14).

Descriptors: *Storm runoff, *Urban runoff, *Suspended solids, *Biochemical oxygen demand, Storm water, Coliforms, Antecedent, Precipitation, Sampling, Automation, Methodology, Planning, Cities, Urbanization, Watersheds(Basins), Indiana, Water pollution sources, Waste identification, Rainfall.
Identifiers: *Pollutographs, *Sampling methodologies, Antecedent dry period.

Stormwater runoff samples were collected and analyzed from urban and semi-urban/rural watersheds located in West Lafayette, Ind. Preliminary sampling was performed in order to develop sampling methodology; i.e. to determine the importance of sampling frequency, duration etc., on the resultant stormwater pollutographs. The effects of total rainfall, rainfall intensity, and antecedent dry period on the run-off quality were also determined. The data clearly showed a significant difference in the pollutional concentration of BOD and suspended solids between the urban and semi-urban/rural watersheds. The peak concentration was almost always higher in the urban watershed, being 1-2 times higher in suspended solids and 8-9 times higher in BOD. The mass emission pollutographs were affected by both concentration and flow. However, the flow hydrograph had a much more significant effect on the shape and magnitude of the pollutograph than did concentration. There were indications that the antecedent dry period prior to the storm event had an effect on the magnitude of the mass emission pollutograph. This will receive more study in future research. (Wiersma-Purdue)
W77-02995

ADAPTATION TO INCREASING SALINITY OF THE COLORADO RIVER,
California Univ., Davis. Dept. of Land, Air and Water Resources.
For primary bibliographic entry see Field 3C.
W77-02997

DETECTION OF PATHOGENIC LEPTOSPIRES IN EFFLUENT AND SEWAGE SLUDGE FROM LARGE PIGGERIES, (IN GERMAN),
Institutul Agronomic din Timisorara (Rumania) Faculty of Veterinary Medicine.
For primary bibliographic entry see Field 5A.
W77-02998

IMPACT OF URBANIZATION ON WATER YIELD, FLOOD PEAK SEDIMENT YIELD, AND WATER QUALITY IN THE BERKELEY HILLS, CALIFORNIA,
California Univ., Berkeley. School of Forestry and Conservation.
For primary bibliographic entry see Field 4C.
W77-02999

HYDRAULIC SIMULATION USING DISTRIBUTED PARAMETERS,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2A.
W77-03001

BIOTRANSFORMATION AND CHEMICAL FORM OF MERCURY IN PLANTS,
Environmental Montoring and Support Lab., Las Vegas, Nev.
For primary bibliographic entry see Field 5C.
W77-03006

EXTENSIVE OVERBURDEN POTENTIALS FOR SOIL AND WATER QUALITY,
West Virginia Univ., Morgantown. Div. of Plant Sciences.
R. M. Smith, A. A. Sobek, T. Arkle, Jr., J. C. Sencindiver, and J. R. Freeman.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 739, Price codes: A15 in paper copy, A01 in microfiche. Environmental Protection Agency, Environmental Protection Technology Series, Report EPA 600/2-76-184, August, 1976. 310 p, 9 fig, 166 tab, 36 ref.

Descriptors: Pennsylvania, Alabama, Oklahoma, *Mining, *Soil classification, *Strip mines, *Strip mine wastes, Weathering, *Coal mines, *Mine acids, Water quality, *Appalachian Mountain Region, *Toxicity, *Nutrients, Acidic soils, *Water pollution sources, On-site-investigations.
Identifiers: *Potential toxicity, Available nutrients, *Mine soils, Acid base account.

Chemical, physical and mineralogic measurements and interpretations developed during previous studies in West Virginia have been improved and applied to coal overburden columns in 12 widely spaced Neighborhoods and 2 Adjunct locations in 10 states, from Pennsylvania on the Northeast to Alabama on the Southeast and Oklahoma on the West. Field studies in each Neighborhood and Adjunct location involved logging and sampling soil and rock horizons from surface to coal, testing and improving field clues, determining properties of minesoils and water resulting from mining operations, and checking reclamation. Results in different coal basins have broadened our perspectives and strengthened our conclusions. Refinements have been made in field observations, laboratory methods and interpretations related to kinds of mine soils and anticipated uses of mined lands. Consistent overburden property relationships within basis and over particular named coals provide opportunities for generalizations and extrapolation between sampled sites. It appears feasible to use detailed information from overburden sampling and analysis as an aid to pre-mining planning of surface mining operations including reclamation and projected land use. (Katz)
W77-03008

CADMIUM IN AN AQUATIC ECOSYSTEM: DISTRIBUTION AND EFFECTS,
New York Univ. Medical Center, N. Y. Inst. of Environmental Medicine
T. J. Kneip, and H. I. Hirshfield.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-242 180, Price codes: A06 in paper copy, A01 in microfiche. Report NSF-RA-E-74-044, 1975. 114 p, 4 tab, 4 fig, 10 ref.

Descriptors: *Cadmium, *Nickel, *Water pollution sources, *Water pollution effects, *Industrial wastes, *Hudson River, *Aquatic animals, *Mussels, Water quality, Plankton, Methodology, Toxicity, Fish eggs, Benthos, Methodology, *Ecosystems.
Identifiers: *Macrobenthic population studies, Fish toxicology, Macrobenthic toxicology.

This report is concerned with evaluating the distribution and effects of cadmium and nickel released into an aquatic ecosystem by local industry. The study focused upon the Foundry Cove Area which includes both a tidal marsh and an associated cove on the east side of the Hudson River just north of Constitution Island. The study provides data regarding (1) the processes resulting in the spread of contamination and (2) preliminary systematic information on uptake by biota and possible effects on certain organisms in the ecosystem. (Katz)
W77-03009

THE BIOLOGY AND CHEMISTRY OF A WARM-WATER STREAM,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 5C.
W77-03010

THE MICROBIAL DEGRADATION OF OIL IN CONTINUOUS CULTURE,
State Univ. of New York at Brockport. Dept. of Biology.
P. H. Pritchard, and T. J. Starr.
Available from the National Technical Information Service, Springfield, VA 22161 as AD/A-013 322, Price codes: A05 in paper copy, A01 in microfiche. Annual Report No. 2, June 1975. 81 p, 8 tab, 14 fig, 59 ref. Task No. 133-070. ONR 0014-73-C-0074.

Descriptors: *Oil pollution, *Laboratory te *Methodology, *Oily water, *Oil spills, *Oil-wa interface, Laboratory analysis, Aqu microbiology, *Microbial degradation, *Biologi treatment, Aquatic environment, Gas chromat raphy.
Identifiers: *Microbial oil degradation, *Diesel *Continuous culture, Bacterial seeding, *Fate oil.

This project has dealt with the development testing of an experimental laboratory model the microbial degradation of oil in aqu ecosystems. The type of oil used in these stu was a light diesel oil. The model, which is a c tinuous culture system, allowed us to observe fate of a mini oil spill under quiescent condition a laboratory situation. The existence of a comp and very sensitive degradation process whic carried out by a diverse population of bacteria demonstrated. The bacterial attack follows a c sistent pattern of slow emulsification, dispersi and chemical alteration of the oil. It has b verified that the disappearance of oil from the face of a body of water does not, by any mea coincide with its complete degradation. The c plexity of the process, established herein, ex plifies the impractability of using 'seed procedures with commercial 'oil-eating' bacte preparations to deal with oil spills. The degradation process in our system was readily tered by the presence of simple organic pollut and not necessarily enhanced by the addition detergents. (Katz)
W77-03012

ANALYSIS OF NONPOINT-SOURCE POL TANTS IN THE MISSOURI BASIN REGION,
Midwest Research Inst., Kansas City, Mo.
A. D. McElroy, F. Y. Chiu, and A. Aleti
Available from the National Technical Infor tion Service, Springfield, VA 22161 as PB 245 Price codes: A09 in paper copy, A01 in microfi Environmental Protection Age Socioeconomic Environmental Studies Series, port EPA 600/5-15-004, March 1975. 163 p, 9 34 fig. Program Element 1BA030. 68-01-1863

Descriptors: *Water pollution sources, *Miss River, *Methodology, *Data collections, D processing, *Data storage and retrieval, *W quality, Climactic data, *Land use, Soil classif tion, *Statistical methods, Biochemical oxygen mand, *Nitrates, Turbidity.
Identifiers: Regression equation, *Water qua profiles, *Statistical analysis of significa *Missouri River Basin, *Nonpoint source po tants.

A study was conducted of nonurban, nonp sources of pollution in the Missouri Basin utili a unique, computer-based data system. The D Bank contains extensive information on land soil, climate, water quality, and other parame in the Missouri Basin. The current study was c cerned with the adequacy of the Data Bank r tive to development of nonpoint pollution mod Evaluation of information in the Data B yielded detailed land use and water quality prof in the basin. The results show that the Data B is a useful base to depict the basinwide relati between various land uses and water qua Regression equations of these relationships w developed for individual subbasins as well as the entire basin. The regression equations, and accompanying statistical analysis of significa indicated that the water quality parameters nitr BOD, and turbidity correlate well with land use a basinwide basis. Other parameters, nam phosphorous, dissolved oxygen, and dissol solids, did not correlate well with land use. (Kat W77-03013

DETERMINATION OF ESTIMATED ME MINE WATER QUANTITY AND QUAL

OM IMPERFECT DATA AND HISTORICAL CORDS.
ironmental Quality Systems, Inc., Rockville,

ilable from the National Technical Informa- Service, Springfield, VA 22161 as PB-242 721, e codes: A09 in paper copy, A01 in microfiche. palachian Regional Commission, Washington, .,, Report ARC-72-108 (RPC 728), January 3. 166 p, 24 tab, 19 fig.

criptors: *Water pollution, *Methodology, al mine, *Water pollution sources, nitoring, *Statistics, Coal mine wastes, *Acid e wastes, Mine acids, *Mine wastes, Data col- ion, Hydrologic data, Mathematical studies, st Virginia, Pennsylvania, Maryland.
ntifiers: Imperfect data, Historical records, nogahela River Basin.

s report isone of a series dealing with different ects of environmental pollution in the nogahela River Basin. The purpose of the study to develop a methodology determining the in- ase or decrease and the sources of pollution en complete data is not available. Special atten- was given to acid mine drainage. (Katz)
7-03014

SULTS FROM AQUATIC ECOLOGICAL RVEYS AT NEWPORT ARMY AMMUNI- ON PLANT, NEWPORT, INDIANA,
gewood Arsenal, Aberdeen Proving Ground,

primary bibliographic entry see Field 5C.
7-03015

ANTITATIVE RELATIONS BETWEEN THE YOPHYTES OF THE BELGIAN PART OF E RIVER SAMBRE AND THEIR FREQUEN- OF EMERSION: VERTICAL DISTRIBU- ON AND INFLUENCE OF POLLUTION, (IN ENCH),
ge Univ. (Belgium). Dept. of Botany.
in Empain.
l Soc R Bot Belg 107(2); p 361-374, 1974.

scriptors: *Mosses, *Submergence, *Rivers, ater pollution effects, *Environmental effects, logical distribution, Ecology, Speciation, ulation.
ntifiers: *Belgium, Bryophytes, Bryum argen- m, Cinclidotus danubicus, Clinclidotus fontina- les, Cinclidotus nigricans, Collema crispum, lytrichia mucronata, Didymodon spadiceus, ersion frequency, Homolathecium sericeum, pnum cupressiforme, Lunularia cruciata, Oc- iceras fontanum, Orthotrichia anomalum, hotrichia cupulatum var. nudum, Platyhypnidi- riparioides, Sambre, Schistidium apocarpum, ertical distribution.

e species, Octodiceras fontanum, can be con- ered strictly aquatic. This moss reacts poorly to idental emersion (exposure to the air). Two cies resist continuous immersion, but are ed to frequent emersion: Cinclidotus nigricans d C. danubicus. C. fontinaloides and Lunularia ciata prefer fairly prolonged emersion, but not excess. Dialytrichia micronata, Didymodon diceus, Orthotrichia cupulatum var. nudum, O. malum and the lichen Collema crispum require longed emersion. Platyhypnidium riparioides a broad ecological amplitude regarding quency of emersion, which permits it to grow in ost continuous immersion or in prolonged ersion. Accidental immersion is unfavorable to strictly terrestrial species, such as molathecium sericeum, Hypnum cupres- orme, etc. Schistidium apocarpum and Bryum enteum, although terrestrial, are only slightly luenced by temporary immersion. In general the tical transition between the populations is rper than expected from the potential ecologi- amplitude of the various species. In the case of olerant species, P. riparioides, the degradation of the environment by pollution enables it to effectively exploit its tolerance of frequent emersion. When ecological conditions become severe the number of species diminishes and the average frequency of species increases.--Copyright 1976, Biological Abstracts, Inc.
W77-03038

BEHAVIOR OF HYDRAZINE COMPOUNDS IN HARD AND SOFT WATER,
Air Force Systems Command, Wright-Patterson AFB, Ohio.
A. R. Slonim.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A019 401, Price codes: A03 in paper copy, A01 in microfiche. Aerospace Medical Research Laboratory, Report AMRL-TR-75-72, September 1975, 26 p, 5 tab, 1 fig, 9 ref.

Descriptors: *Water pollution sources, *Organic compounds, Physical properties, Hardness(Water), Alkalinity, Hydrogen ion concentration, Conductivity, Dissolved oxygen, Laboratory tests, Water quality, Biochemical oxygen demand.
Identifiers: *Hydrazine, 1,1-dimethylhydrazine, Unsymmetrical dimethylhydrazine, *Aerozine-50, Monomethylhydrazine, Hard water, Soft water, Propellant solution.

The behavior of hydrazine, 1,1-dimethylhydrazine (known as unsymmetrical dimethylhydrazine, UDMH), Aerozine-50, and monomethylhydrazine (MMH) in hard and soft water was studied prior to evaluating their effects on aquatic organisms. Hard and soft water propellant solutions were examined over a 96-hour period for changes in physical characteristics, phenolphthalein and total alkalinity, pH, specific conductance, EDTA hardness, and dissolved oxygen (DO). All four compounds at low concentrations (0.1 and 1.0 mg/l) had no effect on these variables, but at 100 mg/l produced changes that were significantly different between hard and soft water, indicating an appreciable amount of coordination of hydrazine compounds with calcium and other hard water ions. The oxygen level was reduced by all four compounds at 100 mg/l usually within the first day; in one detailed study, hydrazine in hard water caused the greatest drop in DO at 5 to 13 hours of exposure. In general, the propellant effects were not of a magnitude to preclude conducting acute toxicity tests in an open static bioassay. (Katz)
W77-03042

RECOVERY OF POLLUTED LAKES; A SWEDISH RESEARCH PROGRAM ON THE EFFECTS OF ADVANCED WASTEWATER TREATMENT AND SEWAGE DIVERSION: 7. DIFFUSE MUNICIPAL POLLUTION: EXAMPLES FROM THE TOWNS OF MOTALA AND UPPSALA, (IN SWEDISH),
Uppsala Kommun Naturvardsverkets RR-Undersokning (Sweden). Algtestlab. Fysiol. Bot.
For primary bibliographic entry see Field 5D.
W77-03057

5C. Effects Of Pollution

EXPERIMENTAL NITRITE TOXICITY IN RAINBOW TROUT AND CHINOOK SALMON,
Bureau of Sport Fisheries and Wildlife, Bozeman, Mont. Fish Cultural Development Center.
C. E. Smith, and W. G. Williams.
Trans Am Fish Soc. 103(2), p 389-390, 1974.

Descriptors: *Toxicity, *Nitrites, *Rainbow trout, *Chinook salmon, Water pollution effects, Mortality.
Identifiers: Nitrate-nitrogen.

Two groups of 20 yearling rainbow trout (Salmo gairdneri) were exposed continuously to inflowing water containing 0.15 and 0.55 mg/liter nitrite as nitrite nitrogen (NO2-N), for 48 and 24 h, respectively. Both groups developed methemoglobinemia but mortality occurred only at the highest concentration (55%). Salmon (Oncorhynchus tschowytscha) exposed to 0.50 mg/liter NO2-N for 24 h developed methemoglobinemia and suffered a 40% mortality. Fingerling trout were less sensitive to nitrite than yearlings.--Copyright 1974, Biological Abstracts, Inc.
W77-02581

SEASONAL VARIATIONS IN CONCENTRATIONS OF NITRATE AND TOTAL PHOSPHORUS, AND CALCULATED NUTRIENT LOADING FOR SIX LAKES IN WESTERN NEW YORK,
State Univ. of New York at Buffalo. Dept. of Biology.
K. M. Stewart, and S. J. Markello.
Hydrobiologia. 44(1), p 61-89, 1974.

Descriptors: *Seasonal, *Nitrates, *Phosphorus, Soils, *Nutrients, Lakes, *New York, Water pollution effects.
Identifiers: England(Lakes).

Seasonal variations in concentrations and ranges of nitrate and total phosphorus were measured in 6 lakes (Conesus, Canadice, Honeoye, Devil's Bathtub, Java and Lime) of western New York. The variations may reflect the geochemistry of the area, local differences in lake hydrology and mixing characteristics, and the supply of nutrients from soil, man, and precipitation. Calculations, of nutrient (P) loading were made for the 6 lakes in New York, and compared to loading values for 9 English lakes. The specific values derived from the calculations cannot be considered absolute but they do indicate the relative importance of human vs. edaphic contributions and provide an aid in management consideration.--Copyright 1974, Biological Abstracts, Inc.
W77-02588

EFFECTS OF RECREATION ON WATER QUALITY IN WILDLANDS,
Colorado State Univ., Fort Collins, Colo. Dept. of Recreation Resources.
R. Aukerman, and W. T. Springer
Available from the National Technical Information Service, Springfield, VA 22161 as PB-251 104, Price codes: A03 in paper copy, A01 in microfiche. Eisenhower Consortium for Western Environmental Forestry Research, Fort Collins, Bulletin, No. 2, 28 p, Febuary, 1976. 1 fig, 36 ref, 7 tab.

Descriptors: *Water pollution, *Camping, *Recreation wastes, Water pollution sources, Wastes, Water pollution effects, Colorado, Bacteria, Roads, Camp sites, Turbidity, Dissolved oxygen, Water quality, Rocky Mountain region.
Identifiers: *Colorado Front Range, Wildlands.

The effect of present concentrations and varying types of campers upon water quality in the Colorado Front Range west of Fort Collins, Colorado, was studied. The eight campgrounds studied are heavily used, located along water, accessible by different types of access routes (paved and unpaved road and footpaths), and cater to different types of campers (motorized campers, camper-trailer, and backpack campers). Results indicate that recreational use is not at present a significant cause of bacterial water pollution, and ancillary monitoring shows that turbidity and dissolved oxygen concentrations are also unaffected by recreation use. In the case of motorized-camper campgrounds, provisions should be made to prevent vehicular approach to water bodies. (Witt-IPC)
W77-02590

GROUNDWATER POLLUTION BY WOOD WASTE DISPOSAL,
Oregon State Dept. of Environmental Quality, Salem.
For primary bibliographic entry see Field 5B.
W77-02591

PHYSICAL AND BIOLOGICAL EFFECTS OF THERMAL DISCHARGES AT LA CYGNE LAKE, VOLUME I: PROJECT REPORT,
Kansas Water Resources Research Inst., Manhattan.
G. P. Willhite, F. B. Cross, W. J. O'Brien, Y. S. Yu, and J. Wagner.
Completion Report, KWRRI Contribution No 174, July 1976. 160 p, 48 fig, 14 tab, 89 ref. OWRT B-032-KAN(1), 14-31-0001-3889.

Descriptors: *Mathematical models, Water quality, *Instrumentation, *Zooplankton, *Phytoplankton, *Fish population, *Thermal pollution, *Kansas.
Identifiers: *Thermal discharge effects, Power generation, *Temperature distributions, *Lake circulation, Wind stress, Predictive methods, *La Cygne Lake(Kan).

An interdisciplinary study was conducted at La Cygne Lake (1052 ha) in eastern Kansas in order to determine the physical and biological effects of thermal discharges from an 840 MW power plant. Results cover three years of study, including periods before and after plant start-up. Power generation was intermittent during the study. Temperature distribution and circulation patterns were controlled by interactions of wind stress on the surface of the water and the morphometry of the lake. Available predictive models were evaluated. Seasonal variations of temperature prior to power plant operation were predicted satisfactorily. Accurate prediction of temperature distribution caused by thermal discharge into the lake was not possible with available models. Particulate carbon, alkalinity and orthophosphate declined due to successional events, whereas hardness and sulfates increased with plant operation. Reduced abundance of Chlorophyll a near the discharge weir correlated with power production in the summer but not in winter. One species of zooplankton gained a competitive advantage in the lake after thermal discharge began. The relative abundance and age distribution of the fish population changed as a successional event. Fish were continuously attracted to the discharge region by plant induced circulation and increased temperature. No detrimental biological effects were observed. Application of La Cygne results to other reserviors is discussed. (See also W77-02617)
W77-02616

PHYSICAL AND BIOLOGICAL EFFECTS OF THERMAL DISCHARGES AT LA CYGNE LAKE, VOLUME II: PROCEDURES AND SELECTED FIELD DATA,
Kansas Water Resources Research Inst., Manhattan.
G. P. Willite, F. B. Cross, W. J. O'Brien, Y. S. Yu, and J. Wagner.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 887, Price codes: A09 in paper copy, A01 in microfiche. Completion Report, KWWRI Contribution 174, July 1976, 160 p. OWRT B-032-KAN(1).

Descriptors: *Data collections, Kansas, Thermal pollution, Climatic data, Hydrologic data, Water quality, Waves(Water), Water temperature, Plankton, Fish, Computer programs.
Identifiers: La Cygne Lake(Kan), Drogue track studies.

Selected tabular and graphical information are presented on: Climatological and Hydrological Data; Water Quality; Wave and Drogue Track Studies; Temperature Surveys; Plankton Data; Fish; and Computer Programs for One-Dimensional Heat Transfer Models. (See also W77-02616)
W77-02617

ECOLOGICAL MODELING AND ESTIMATION OF STRESS,
Rensselaer Polytechnic Inst., Troy, N.Y. Fresh Water Inst.
R. A. Park.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 952, Price codes: A02 in paper copy, A01 in microfiche. Report FWI 75-14 (EDFB-IBP 245), October 1975. 20 p. 14 fig. OWRT C-2209(No. 3307) N.Y.(3), EPA 68-03-2142, NSF BMS 69-01147A09 and BMS 75-14168, OWRR 14-31-0001-3387.

Descriptors: *Computer models, *Environmental effects, *Ecosystems, *New York, Diatoms, Population, Bioindicators, Trophic level, Eutrophication, Land use, Lakes.
Identifiers: *Lake George(NY), Multivariate analysis, Aquatic models, Terrestrial models, CLEANER computer model, LAND computer model.

Ecological modeling procedures are being used to study environmental impacts on Lake George, New York. A multivariate analytical approach, including cluster analysis and ordination, helps facilitate the interpretation and delineation of biotic responses to stresses, such as nutrient enrichment as shown by diatom death assemblages. General trends in nutrient enrichment were determined and a gradational series of patterns developed, resulting in a map of the nutrient stress on each part of the lake. Nutrient-enriched areas were adjacent to population centers and nutrient-poor areas in undeveloped parts. Aquatic and terestrial simulation models provide insights into complex relationships and, through perturbation analysis, permit evaluation of the consequences of environmental impact. CLEANER, an aquatic ecosystem model, represents functional ecologic and physiologic relationships. Stresses like changes in temperature, nutrients, and turbidity can be studied. Perturbations in the driving variables result in simulations that estimate the complex effects of environmental stress on all major ecosystem components. LAND, a terrestrial ecosystem and land-use model, is being developed to simulate land-use changes and vegetational succession. It subdivides the area and considers site-specific soil, slope, vegetational, aesthetic, and cultural characteristics of each. Coupled with CLEANER it will provide basin-wide analyses. (Buchanan-Davidson--Wisconsin)
W77-02622

THE ENVIRONMENTAL FATE OF SELECTED POLY-NUCLEAR AROMATIC HYDROCARBONS,
Stanford Research Inst., Menlo Park, Calif
For primary bibliographic entry see Field 5B.
W77-02625

POLLUTION ASPECTS OF CATFISH PRODUCTION - REVIEW AND PROJECTIONS,
Georgia Univ., Athens. Dept. of Agricultural Engineering.
J. C. Barker, J. L. Chesness, and R. E. Smith.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-244 943, Price codes: A07 in paper copy, A01 in microfiche. Report EPA-660/2-74-064, July, 1974, 121 p., 35 tab., 24 fig., 66 ref.

Descriptors: *Aquiculture, *Water pollution effects, Freshwater fish, *Reviews, *Waste disposal, Water quality, Oxygen, Biochemical oxygen demand, Nitrogen, Ammonia compounds, Waste treatment, Phosphorous compounds, Phosphates, *Catfishes, Wastes, Suspended solids, Bibliographies.
Identifiers: *Catfish culture, *Catfish wastes, Biological degradation, BOD reductions.

A literature review and field study was undertal to determine the waste concentrations discharge loadings occurring in the waters fr catfish-culturing ponds and raceways. Wa quality analyses were performed on samples tal during a 240-day growing season and at drawdo (assuming drainage at harvest). The natural biol ical degradation of the raw wastes in the ponds raceway systems resulted in BOD reductions 96.8% and 98.0%, respectively, when compare waste levels produced in indoor single pass t systems with no waste removal facilities. Red tions in total nitrogen of 97.2% and 97.7% occur in ponds and raceways, respectively. Sedimer tion and biodegradation resulted in an 83. reduction in suspended solids in ponds and 86.2% suspended solids reduction in raceww Total phosphate levels were reduced by 98.5% ponds and raceways, respectively. (Katz)
W77-02626

EFFECTS OF CRUDE OIL ON MARINE INVE TEBRATES,
Texas Univ. Medical Branch at Galveston. Mar Biomedical Inst.
J. S. Kittredge
Available from the National Technical Infor tion Service, Springfield, VA 22161 as AD-A 921, Price codes: A02 in paper copy, A01 microfiche. Final Report to Office of Na Research, 26 August 1975, 5 p., 2 ref.

Descriptors: *Crustacea, Crabs, Oil, *Oil po tion, *Physiology, *Behavior, *Food hab Ecology, Environment, Benthos, Methodolo Shrimp, Oil spill, Environmental effects, Labo tory tests, Sea water, Water pollution effe *Invertebrates, Organic compounds
Identifiers: Pacific Lined Shore Crab, Menip mercenaria, Feeding response, Naphthalene, kylnaphthalnes, Aliphatic hydrocarbons, Polya matic hydrocarbons

A brief summary of research on the effects crude oil on the behavior of marine invertebra principally crustaceans. Behavior patterns amined was the feeding response. Polyaroma hydrocarbons were probably the potentially d gerous component of oil pollution. (Katz)
W77-02627

TRACE HYDROCARBON ANALYSIS: THE N TIONAL BUREAU OF STANDARDS, PRIN WILLIAM SOUND/NORTHEASTERN GULF ALASKA, BASELINE STUDY,
National Bureau of Standards, Washington, D. Analytical Chemistry Div.
For primary bibliographic entry see Field 5A.
W77-02628

LITERATURE STUDY OF SELECTED POTE TIAL ENVIRONMENTAL CONTAMINANT ANTIMONY AND ITS COMPOUNDS,
Little (Arthur D.), Inc., Cambridge, Mass
Available from the National Technical Infor tion Service, Springfield, VA 22161 as PB-251 4 Price codes: A08 in paper copy, A01 in microfic Report EPA-560/2-76-002, February 1976. 147 15 tab., 139 ref.

Descriptors: *Metals, *Public heal *Environment, Environmental sanitation, E vironmental effects, *Chemical indust *Toxicity, *Occupation, Air pollut *Bibliographies, Water pollution.
Identifiers: *Antimony, *Antimony compoun Occupational diseases, Antimony industries, A timony dusts, Pneumoconiosis, Antimony toxi ty, Industrial antimony, Antimony trioxide, Tar emetic.

A comprehensive review of the literatu published since 1 January 1954 was conducted prepare this preliminary investigation report the physical and chemical properties of antimo

Sb) and its compounds, on the environmental factors related to their consumption and use, on the health and environmental effects resulting from exposure to Sb and antimonials, and on the regulations and standards governing their use. Antimony and its compounds, although not ranked among the biggest volume chemicals in the U. S., are industrially significant because of their contribution to the manufacture of many commonly-used products, such as alloys, paint, paper, plastics and textiles. Antimony trioxide (antimony oxide) is used to impart flame resistance to plastics, textiles, and other products. Antimony dusts have been associated with the development of pneumoconiosis in miners and other workmen. Some antimony compounds are toxic, or give rise to toxic decomposition products, but no serious occupational poisoning has been associated with the industrial use of antimony. (Katz)
W77-02629

RESIDUAL TOXICITY OF OZONIZED SEAWATER TO OYSTER LARVAE,
Oregon State Univ., Corvallis. School of Oceanography.
J. M. DeManche, P. L. Donaghay, W. P. Breeze, and L. F. Small.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-248 821, Price codes: A02 in paper copy, A01 in microfiche. Sea Grant College Program, Publication No. ORESU-T-75-003, November, 1975. 7 p., 1 tab., 1 fig., 2 ref.

Descriptors: *Ozone, *Oysters, *Toxicity, *Bioassay, Sea water, *Activated carbon, Water quality, *Mollusca, Larvae, Oxygen, Aquatic animals, Laboratory methods, Aquiculture, Water pollution effects.
Identifiers: *Residual toxicity, *Ozonized sea water, *Oxidizing agents, Water sterilization, Sea water culture systems, *Activated charcoal, Aquaculture systems, Ozone toxicity.

Ozone, a potent oxidizing agent, has found wide application in sterilization and control of water quality in fresh-water systems. However, its application to seawater culture systems has been limited by its residual toxicity. This paper describes a method which employs activated charcoal to remove this residual toxicity. The ozone-charcoal treatment sequence should prove beneficial in maintaining water quality for rearing even very sensitive organisms such as oyster larvae. (Katz)
W77-02630

THE MARINE BIOLOGICAL IMPACT OF THE HONOLULU GENERATING STATION,
Hawaii Univ., Honolulu. Sea Grant Program.
J. C. McCain, S. L. Coles, and J. M. Peck, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-248 369, Price codes: A04 in paper copy, A01 in microfiche. Sea Grant Technical Report UNIHI-SEAGRANT-TR-76-01, September, 1975. 50 p, 15 tab, 5 fig, 39 ref.

Descriptors: *Thermal pollution, Thermal stress, *Thermal water, *Water pollution effects, *Water temperature, Aquatic environment, Biological effects, *Environmental effects, Zooplankton, Marine fish, *Reefs, Hawaii, *Coral, Marine environment, Growth, On-the-site investigations, Daily hydrograph.
Identifiers: *Honolulu Harbor, Oahu, *Macrozooplankton, Reef canals, *Outfall jet plume, *Coral growth, *Fish standing crop, Intake basins, Discharge basins.

Studies of the effects of the Hawaiian Electric Generating Station on the zooplankton, reef corals, and fishes of Honolulu Harbor, Oahu, Hawaii were made during 1972-73. No distinct detrimental effects attributable to the generating station were revealed by these studies. The macrozooplankton community in the outfall basin more closely resembled communities sampled outside the harbor than elsewhere in the harbor, which receives a variety of pollutants. Differences in distribution and abundance of macrozooplankton were more closely related to depth and temporal differences than to power station discharge. Although reef corals were restricted from the wall directly in the path of outfall jet plume, the total coverage of live corals in the discharge basin exceeded that of the intake basin and discharge basin coral colonies were generally larger. Negligible coral growth was found anywhere else in the harbor. Fish standing crop in the discharge basin was estimated to be approximately twice that of the intake basin and little movement was noted between the two areas. Standing crop in both basins was generally higher than estimates for tropical and subtropical shallow water areas. No clear comparisons were possible concerning weight per unit length of fishes in the intake versus discharge basins. (Katz)
W77-02631

ANALYSIS AND CONTROL OF THERMAL POLLUTION (178) TRAINING MANUAL,
Environmental Protection Agency, Cincinnati, Ohio. Office of Water Programs Operations.
For primary bibliographic entry see Field 5B.
W77-02632

CADMIUM IN THE ENVIRONMENT - III: A TOXICOLOGICAL AND EPIDEMIOLOGICAL APPRAISAL,
Karolinska Institutet, Stockholm (Sweden).
For primary bibliographic entry see Field 5B.
W77-02633

THE MANUFACTURE AND USE OF SELECTED ALKYLTIN COMPOUNDS, TASK II,
Midwest Research Inst., Kansas City, Mo.
For primary bibliographic entry see Field 5B.
W77-02634

MEDICAL AND BIOLOGIC EFFECTS OF ENVIRONMENTAL POLLUTANTS. CHROMIUM.
National Research Council, Washington, D.C. Committee on Biologic Effects of Atmospheric Pollutants.
National Academy of Science: Washington, D.C., 1974. 155 p, $6.50.

Descriptors: *Chromium, *Reviews, Bibliographies, Water pollution effects, *Pollutant identification, Metabolism, Air pollution, Nutrient requirements, Environmental effects.
Identifiers: *Literature reviews.

Results of literature research on the biologic and health effects of Cr are summarized in this monograph. The literature evaluated covers available publications dating to July, 1972. The opening chapters discuss the properties of Cr, its distribution in the environment and its industrial uses. The subsequent chapters examine the biologic interactions of Cr, its necessity in nutrition, and its absorption, metabolism and excretion. The effects of Cr are studied in humans, aquatic species and vegetation. Results of experimental exposures of animals to Cr compounds are described and standards for Cr content of air and water in various countries are discussed. Conclusive results on the biologic effect of Cr are not provided since they were not available in the literature studied, but areas for future research are recommended. The appendix contains details for the analysis of Cr. An index and a reference list are included. This book will be valuable as a summation of information Cr.--Copyright 1974, Biological Abstracts, Inc.
W77-02635

A STATEMENT OF CONCERNS AND SUGGESTED ECOLOGICAL RESEARCH, REPORT NUMBER 1 OF THE LAKE MICHIGAN COOLING WATER STUDIES PANEL.
Lake Michigan Cooling Water Studies Panel, Chicago, Ill.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-248 131, Price codes: A17 in paper copy, A01 in microfiche. Report EPA-905/3-75-001, Nov. 1975. 382 p., 1 append.

Descriptors: *Freshwater fish, Aquatic life, *Lake Michigan, *Thermal power, *Thermal water, *Thermal power plants, Commercial fish, Biota, Benthos, Plankton, Aquatic algae, Crustaceans, Zooplankton, Phytoplankton, *Electric power, *Water temperature, Radioecology, *Thermal pollution.

A statement is presented of concerns and suggested research by the Lake Michigan Cooling Water Studies Panel. The intent of the statement is to assist the development of investigations of the effects of cooling water use on Lake Michigan. The introductory considerations of Lake Michigan are presented in the first section. The second section presents recommendations toward objective quantification of the effects of cooling water use through proper statistical planning, study design, and data collection. The remaining seven sections relate information the authors consider basic to an understanding of the effects of cooling use on physial and chemical aspect, primary producer and consumer communities, macrozoobenthos, fishery, entrapped and entrained organisms, and radioecology of Lake Michigan. All sections of the report attempt to produce improvement in research design and a trend toward standardization of results. In addition, questions are posed and ranked resulting in numerical priorities with the intent to guide research in those areas of knowledge which are barriers to an adequate understanding of the effects of cooling water use. (Katz)
W77-02636

MEDICAL AND BIOLOGIC EFFECTS OF ENVIRONMENTAL POLLUTANTS. VANADIUM.
National Research Council, Washington, D. C. Committee on Biologic Effects of Atmospheric Pollutants.
National Academy of Science: Washington, D.C., 1974. 113 p. $5.25.

Descriptors: Water pollution effects, Environmental effects, *Reviews, Bibliographies, Water pollution sources, Pollutant identification, Air pollution, Metabolism, Soils.
Identifiers: *Vanadium.

This report by the Panel on Vanadium summarizes the available data on the biologic effect of environmental compounds. The text begins with a discussion on industrial processes and uses involving V and its compounds. Contamination resulting from handling of V residues is examined. The source of V in the ambient air and in the environment are dealt with and emission of V into the air due to combustion of coal and oil, and V concentration in the atmosphere, earth's crust, water, plants, animals and food was covered. The chapter on the biologic effects of V examined the effects on man, experimental animals and on metabolism. Recommendations for future research areas on or related to the biologic effects of V are included. The appendix contains discussions on desulfurization of residual fuel oils and the detection and measurement of V in biologic and pollution materials. Over 200 references are listed and an index is included.--Copyright 1974, Biological Abstracts, Inc.
W77-02637

ASPECTS OF CARBON METABOLISM IN FILAMENTOUS MARINE FUNGI,
Florida Atlantic Univ., Boca Raton. Dept. of Biological Sciences.

P. L. Sguros.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-022 474, Price codes: A02 in paper copy, A01 in microfiche. Final Report to Office of Naval Research, (Washington D. C.), Microbiology Branch, Contract No. N00014-67-A-0320-0002, April 1976. 16 p., 18 ref.

Descriptors: *Degradation, *Marine microbiology, Aquatic fungi, *Marine fungi, *Biodegradation, *Microbial degradation, *Plant physiology, *Biochemistry, Laboratory techniques, Phytoplankton, Mode of Action, Nitrogen, Carbohydrates.
Identifiers: *Carbon metabolism, *Filamentous marine fungi.

A nutritional screening of 117 carbon and/or nitrogen sources against marine fungal cultures revealed poor acceptance of any compound as both C and N source, broad flexibility in accepting nitrogen sources, and a very narrow restriction of C sources to a few cellulose-associated carbohydrates. Oxidative dissimilation of glucose resulted in almost total conversion to cell substance and carbon dioxide. Cell substance averaged 45% C, 5.4% N, and 5.9% H. Economic coefficients averaged 76% decreasing as substrate glucose concentrations increased. Enzymatic studies revealed that glucose can be metabolized by the Embden-Meyerhof-Parnas, pentose glyoxylate bypass. The cellulase complex was found to consist of three inducible agents: hydrocellulase, glucanase and cellobiases, the first two being primarily exocellular and the latter intracellular. Glucanase and cellobiase were favored by pH 5-6 at 37 C, while the former was stable over pH 3-9 and the latter from 5-9 at 37 C. Both enzymes were deactivated in 15 min at 100 C. Cellobiose was a strong inducer of cellulase and Tween 80 stimulated cellulolytic activity greatly. (Katz)
W77-02638

ENVIRONMENTAL POLLUTION IN THE NEW LEAD BELT, (RANN UTILIZATION EXPERIENCE, CASE STUDY NO. 2),
Missouri Univ., Rolla.
For primary bibliographic entry see Field 5B.
W77-02639

COMPILATION OF STATE DATA FOR EIGHT SELECTED TOXIC SUBSTANCES, VOL. V, MONITORING PROGRAM CAPABILITY, DESCRIPTOR TABLES,
Mitre Corp., McLean, Va.
For primary bibliographic entry see Field 5G.
W77-02641

COMPILATION OF STATE DATA FOR EIGHT SELECTED TOXIC SUBSTANCES. VOLUME II, DIRECTORY OF STATE TOXIC SUBSTANCES MONITORING AGENCIES,
Mitre Corp., McLean, Va.
For primary bibliographic entry see Field 5G.
W77-02642

INVESTIGATION OF SELECTED POTENTIAL ENVIRONMENTAL CONTAMINANTS: HALOETHERS,
Syracuse Univ. Research Corp., N. Y., Life Sciences Div.
P. R. Durkin, P. H. Howard, and J. Saxena.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-246 356, Price codes: A09 in paper copy, A01 in microfiche. Report EPA-560/2-75-006, September, 1975, 168 p, 43 tab, 23 fig, 171 ref.

Descriptors: Public health, *Toxicity, *Environmental sanitation, Human pathology, Potable water, Water pollution, Water quality, Chemical industry, *Chemical wastes, Chlorides, Fluorides, Environmental effects, *Reviews, *Bibliographies, Solvents, Mammals.
Identifiers: *Haloethers, bis(chloromethyl)ether, Chlorex, bis(2-chloroethyl)ether, bis(2-isopropyl)ether, a-chloroethers, B-chloroethers, ion exchange ethers.

A review is presented of the potential environmental hazard from the commercial use of haloether compounds. The fluorinated anesthetic ether, methoxyfurane (2,2-dichloro-1,1-difluoroethyl methyl ether) and fluroxene (2,2,2-trifluoroethyl vinyl ether), and only peripherally treated. Major focus is on the a-chloroethers, bis(chloromethyl)-ether and chloromethyl methyl ether, and the B-chloroethers, bis(2-chloroisopropyl)-ether, bis (2-chloroethyl) ether, and bis (2-chloroethoxy) methane. The a-chloroethers are used as chemical intermediates for production of ion exchange resins while the B-chloroethers are used mostly for solvents but have some chemical intermediate uses. Information on physical and chemical properties, production methods and quantities, commercial uses and factors affecting environmental contamination, as well as information related to health and biological effects, are reviewed. (Katz)
W77-02643

MOLYBDENUM: A TOXCOLOGICAL APPRAISAL,
Karolinska Institute, Stockholm (Sweden). Dept of Environmental Hygiene.
L. Friberg.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-249 458, Price codes: A07 in paper copy, A01 in microfiche Report EPA 600/1-75-004, November, 1975, 141 p, 74 tab, 4 fig, 199 ref

Descriptors: *Metals, *Molybdenum, *Toxicity, *Metabolism, *Path of pollutants, Environmental effects, *Bibliographies, *Reviews, Agricultural chemicals, Agriculture, *Public health, Pathology, Physiology, Environmental sanitation, Water pollution, Aquatic organisms, Animal physiology, Copper.
Identifiers: Molybdenum poisoning, Animal experiments, Animal nutrition, Molybdenum essentiality, Teart disease.

This review presents and evaluates the available material on the metabolism and toxicology of molybdenum with emphasis on those aspects of relevance to human beings. Agricultural and environmental aspects of molybdenum are less completely covered. Special efforts have been made to include recent publications in Russian, and to coordinate this work with a similar effort under way in the Environmental Health Criteria Programme of the World Health Organization. (Katz)
W77-02647

PROCEEDINGS OF: NATIONAL CONFERENCE ON HEALTH, ENVIRONMENTAL EFFECTS, AND CONTROL TECHNOLOGY OF ENERGY USE.
Environmental Protection Agency, Washington, D. C. Office of Energy, Minerals and Industry.
For primary bibliographic entry see Field 5G.
W77-02649

THE EFFECTS OF FRESHWATER WITHDRAWALS ON FISH AND WILDLIFE RESOURCES,
Fish and Wildlife Service, Washington, D. C. Western Water Allocation.
For primary bibliographic entry see Field 5G.
W77-02655

FRESHWATER ECOLOGICAL EFFECTS,
Tennessee Valley Authority, Chattanooga.
For primary bibliographic entry see Field 5G.
W77-02657

THE EPA RESEARCH PROGRAM ON THE FRESHWATER ECOLOGICAL EFFECTS OF ENERGY DEVELOPMENT AND USE,
Environmental Protection Agency, Washington, D.C. Office of Health and Ecological Effects.
For primary bibliographic entry see Field 5G.
W77-02658

PROCEEDINGS OF THE TWENTY-EIGHTH ANNUAL GULF AND CARIBBEAN FISHERIES INSTITUTE.
Rosenstiel School of Marine and Atmospheric Science, Miami, Fla.
Held at Bal Harbour, Florida, October 1975. Published in May 1976, 123 p.

Descriptors: *Continental Shelf, *Resources development, *Water pollution effects, *Legal aspects, *Fishing gear, *Fish management, Conferences, Economics.
Identifiers: *Outer Contiental Shelf, Jurisdiction, Echo sounding.

Four groups of papers constitute the proceedings of twenty-eighth annual Gulf and Caribbean Fisheries Institute. The Fisheries Jurisdiction Session consisted of papers on: The New Ocean Regime; The Status of Extended Jurisdiction over Our Fishery Resources; Interstate Marine Compact Commissions--Role in Fisheries Management; Suggested State Legislation for Effective Management of Marine Fisheries; Florida's Position Regarding HR 200 (Extended Jurisdiction); and The Western Central Atlantic Fishery Commission (WECAFC): Its Implications and Impact. The Continental Shelf Session papers were: Multiple-use Conflicts between Fishermen and other Users of the Ocean with a Consideration of a Possible Expanded Federal Role; Identification and Mapping of Fishing Banks on the Outer Continental Shelf of the Gulf of Mexico; Current Studies toward the Protection of the Environment in the MAFLA Area; and Contaminant Effects on Biota of the New York Bight. Papers of the Fisheries Biology Session are: Gear and Economic Efficiency Results of a Sea Grant Twin-Trawl; Abundance and Potential for Fisheries; Aquarium Fish Hobby; Progress toward Management of the Atlantic Bluefin Tuna; Outline for a Southeastern Regional Recreational Fishery Program Development Plan and Status Report of Florida's Research on the Spiny Lobster Biology. The final session was a Fisheries Workshop. (NOAA)
W77-02660

MARINE POLYCULTURE BASED ON NATURAL FOOD CHAINS AND RECYCLED WASTES,
Woods Hole Oceanographic Institution, Mass.
J. H. Ryther.
Woods Hole Oceanographic Institution Technical Report No. WHOI-76-92, October 1976, 281 p. SG-04-6-158-44016.

Descriptors: *Aquiculture, *Marine algae, *Recycling, Waste water treatment, *Food chains, Effluents, Mollusks, Nutrients, Crustaceans, Solid wastes, Shellfish, Sewage treatment.
Identifiers: Recycled wastes, Finfish, Sea weeds.

Research has continued during the past fiscal year on the development, testing, and evaluation of a combined waste recycling-marine polyculture system. The concept of the system is to grow unicellular marine algae (Phytoplankton) in mixtures of seawater and the effluent from a secondary sewage treatment plant. The algae grown in continuous flow-through cultures, are then fed to bivalve molluses, such as oysters, clams, scallops, or mussels. The algae remove the nutrients from the wastewater and the molluscs remove the algae. Finfish (winter flounder) and crustacea (American Lobster) are stocked as post-larval or juvenile animals together with the molluscs to feed upon the solid wastes (feces and pseudo feces) produced by the shellfish and upon the small in-

ebrate fauna (polychaete worms, amphipods, that are supported by these wastes. Seaweeds titute a final polishing stage to the system, ving the effluent from the animal culture m and removing from it nutrients regenerated gh excretion and metabolism of the animals ell as any nutrients from the wastewater not lly removed by the phytoplankton. Twelve re- by various authors are compiled in this ne. (NOAA)
-02662

ARCTIC COASTAL ENVIRONMENT OF SKA. VOL. II: A COMPILATION AND IEW OF SCIENTIFIC LITERATURE OF ARCTIC MARINE ENVIRONMENT,
ka Univ., College. Inst. of Marine Science.
. Feder, D. G. Shaw, and A. S. Naidu.
Grant Program Report No. 76-9, IMS Report R76-5, May 1976. 207 p. SG-04-5-158-35.

riptors: *Arctic Ocean, *Alaska, liographies, *Oil pollution, *Oil spills, eline studies, *Environmental effects, Cold ns, Plankton, Algae, Benthos, Fishes, ts, Ecology.
tifiers: *Outer Continental Shelf, *Marine en- ments, *Environmental impact, Literature ws, Physical oceanography, Chemical nography, Geological oceanography, Marine , Marine mammals.

publication is volume two of a report on the c coastal environment of Alaska. It is a com- on and review of scientific literature of the c marine environment. This reference, for enience of the user, is divided into eleven ters as follows: Physical Oceanography; nical and Geological Oceanography; Plank- Benthic Algae; General Ecological and gical Studies; Ice Algae, Benthic Microalgae Primary Production; Benthic Invertebrates; es; Marine Birds and Mammals; Environmen- mpact; and Oil Pollution: Environmental Ef- of an Oil Spill at Prudhoe Bay. Each chapter ists of a short narrative reviewing key litera- All chapters except chapter two contain a ence section which includes citations, and lemental references. (NOAA)
-02665

TOXICITY OF SELECTED CHEMICALS D IN POWER GENERATING STATIONS TO VAIIAN FISHES,
aii Univ., Honolulu.
McCain, and J. M. Peck, Jr.
Grant Technical Report No. UNIHI-GRANT-TR-77-1, September 1976. 21 p, 1 tab, append. SG-04-6-158-44114.

riptors: *Toxicity, *Hawaii, *Powerplants, vironmental effects, *Water pollution effects, atic animals, Fishes, Waste disposal, Chemi- astes.
tifiers: Ocean dumping, Amines, Morpholine, er generating stations.

acute toxicity of two waterborne chemicals to s was investigated. The two compounds, film- mine and morpholine, are used as corrosive itors in the stream and condensate lines of power generating stations on Oahu. The e-static 96-hr LC_{50} or TLm for these com- ds was determined for four common aiian marine fishes--the mosquito fish, Gam- affinis; the white mullet, Chelon engeli; the elfish, Dascyllus albisella; and a species of ia. The 96-hr TLm for morpholine was found between 100 and 180 ppm for Chelon engeli between 320 and 560 ppm for Gambusia af- The 96-hr LC_{50} value for filming amine was d to be 0.41 ppm for adult Gambusia affinis he 96-hr TLm to be 0.25 ppm for juveniles. range finding results for Chelon engeli, yllus albisella, and Tilapia sp. indicated ar toxicity values for the filming amine. The discharges of these compounds do not exceed the maximum permissible values as determined by the LC_{50} or TLm values after applying a 0.01 factor. The discharge of these compounds at less than 0.0025 ppm for filming amine and 1.00 ppm for morpholine does not constitute a waste as currently defined by state and federal laws and regulations. (NOAA)
W77-02666

AN INVENTORY AND STUDY OF THE LAKE PONTCHARTRAIN-LAKE MAUREPAS ESTUARINE COMPLEX.
Louisiana Wildlife and Fisheries Commission, New Orleans. Div. of Oysters, Water Bottoms and Seafoods.
For primary bibliographic entry see Field 2L.
W77-02671

ABSTRACTS. SPECIAL SYNPOSIUM - THE MIDDLE ATLANTIC CONTINENTAL SHELF AND NEW YORK BIGHT,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
M. G. Gross.
Held at American Museum of Natural History, New York City, NY on November 3-5, 1975. 79 p.

Descriptors: *Abstracts, *Continental Shelf, Marine biology, Marine fisheries, Marine geology, Oceanography, Ocean circulation, Meteorology, Environmental effects, Water pollution sources, Water pollution effects, Ecology, Pollutants, Ecosystems, Waste disposal, Conference.
Identifiers: *Outer Continental Shelf, *New York Bight, Middle Atlantic Continental Shelf, Coastal zone, Marine Ecosystems Analysis Program(MESA).

This is a collection of abstracts of 42 papers presented at a special symposium on the Middle Atlantic Continental Shelf and New York Bight. Subjects encompass all aspects of the marine sciences and fisheries, contamination or pollution and its effects on the environmental and aquatic communities. Interactions between the ocean and atmosphere are dealt with along with various pertinent aspects of marine meteorology. (NOAA)
W77-02678

THE METULA OIL SPILL,
National Oceanic and Atmospheric Administration, Boulder, Colo. Marine Ecosystems Analysis Program Office.
C. G. Gunnerson, and G. Peter.
Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. NOAA Special Report, September 176. 42 p, 18 fig, 4 tab, 9 ref, 2 append. Also in Spanish.

Descriptors: Aquatic life, *Oil spills, *Oil pollution, *Water pollution effects, *Tidal marshes, Environmental effects, *Baseline studies, *Intertidal areas, *Coastal marshes, *Estuarine environment, Beaches, Continental shelf, Cold regions, South America.
Identifiers: Outer Continental Shelf, *Strait of Magellan, Tierra del Fuego, Environmental impact, Supertankers, Crude oil.

In August 1974 the supertanker METULA ran aground in the Strait of Magellan and spilled over 50,000 tons of light Arabian crude oil. The spill was not contained and the oil was carried over large segments of beaches and tidal marshes of Tierra del Guego, and deep into the estuaries of the area. Findings of a team of scientists from the United States and Chile, who investigated the environmental damage in August 1974 and again in January 1975, and of others who discussed the spill at a workshop, are summarized. Included are the background of the accident, the physical environment, the reasons why cleanup measures were not attempted, and the most important follow-up research needs. The research results will be used to identify critical environmental information that can be transferred for use in planning and for predicting environmental impacts in other similar areas of the world. (NOAA)
W77-02679

THE EFFECTS OF TEMPERATURE ON DISEASES AND THEIR HISTOPATHOLOGICAL MANIFESTATIONS IN FISH,
R. J. Roberts.
In: The Pathology of Fishes, W. E. Ribelin, ed., The University of Wisconsin Press, Madison, Wisconsin, p. 477-496, 1975. 7 fig., 37 ref.

Descriptors: *Fish diseases, *Pathology, *Pathogenic fungi, *Temperature, *Bacteria, *Viruses, *Epidemiology, *Pathogenic bacteria, *Infection, *Zoonoses, Aquiculture, Fish farming, Salmonids, Channel Catfish, Diseases, Microbiology, Heated water, Streptococcus, Aquatic microorganisms, Parasitism.

Bacterial, viral and parasitic diseases and the effect of temperature on the course of these diseases in teleosts is discussed. The pathogenicity of these infectious agents is closely tied to temperature, both in the viability of the organism at a given temperature and in the vulnerability of the fish. Defense mechanisms of the fish are examined in terms of their effectiveness at various temperatures. Skin lesions, a major route of infection, heal slowly at 4C with little cellular inflammatory response, while at 14C there was rapid epithelialization. The fixed macrophage system, circulating antibodies, antiferons and circulating leukocyte systems in fish are discussed. (Katz)
W77-02692

LESIONS ASSOCIATED WITH CHRONIC EXPOSURE TO AMMONIA,
C. E. Smith, and R. G. Piper.
In: The Pathology of Fishes, W. E. Ribelin, ed., The University of Wisconsin Press, Madison, Wisconsin, 1975, p 497-514. 1 tab., 6 fig., 29 ref.

Descriptors: *Aquiculture, *Rainbow trout, *Trout, Water quality, *Fish diseases, *Fish farming, *Fish toxins, *Fish physiology, *Dissolved oxygen, *Ammonia, Mortality, Sport fish, Nitrogen compounds, Water pollution sources, Water pollution effects, Microscopy, Growth rates.
Identifiers: *Histology, *Gills.

Rainbow trout were exposed to ammonia concentrations of approximately 0.5, 1.0 and 1.5 ppm as total ammonia for 12 months. When compared to controls, growth of trout was not affected after four months' exposure to 1.0 and 1.5 ppm ammonia. There was a significant reduction in growth after 6 and 12 months for fish reared in 1.6 ppm. Mortality was the same in test and control groups. Pathological changes were observed in gills and livers exposed to 1.6 ppm ammonia for 6 months. As long as oxygen concentrations are kept at 5.0 ppm, it is unnecessary and impractical to maintain ammonia concentrations at 0.1 ppm when rearing rainbow trout. (Katz)
W77-02693

THE PATHOLOGY OF PESTICIDE POISONING,
A. H. Walsh, and W. E. Ribelin.
In: The Pathology of Fishes, W. E. Ribelin, ed., University of Wisconsin Press, Madison, Wisconsin, 1975. p. 515-541. 10 tab., 39 ref.

Descriptors: *Pesticides, *Pathology, *Salmonids, *Lake Trout, *Bioassay, *Fishkill, *Toxins, Water pollution effects, Analytical techniques, *Pollutant identification, Reviews, *2,4-D, *DDT, Chlorinated hydrocarbon pesticides, Laboratory tests, Microscopy.
Identifiers: *Histology, *Carbaryl, *Atrazine, *Coho salmon.

Laboratory tests were conducted in which coho salmon (Oncorhynchus kisutch) and lake trout (Salvelinus namaycush) were exposed to several pesticides and then examined for gross and microscopic tissue changes. Comparison between results of this experimentation and observations from the literature are made. Hyperplasia of gill lamellar epithelium, a suggested result of pesticide exposure, was more common in control fish than in test fish in these tests. 'Shrunken' spleens and reduction in the number of lymphocytes in spleens of exposed fish occurred after exposure to seven pesticides. Hyperemia in the brains of coho salmon and lake trout exposed to 2,4-D may prove to be of diagnostic value in determining the toxic agent in a fishkill. Behavioral changes could only be properly assessed in laboratory experiments, except for carbaryl (Sevin) and atrazine which cause changes that could be evaluated in the field. Data from these studies and those reviewed were inconclusive in identifying characteristic lesions from any group or class of pesticide for diagnostic purposes. In all cases, except with carbaryl and atrazine, historical or analytical evidence is necessary to identify the pesticide. (Katz)
W77-02694

HISTOPATHOLOGICAL EFFECTS OF PESTICIDES AND RELATED CHEMICALS ON THE LIVERS OF FISHES,
J. A. Couch.
In: The Pathology of Fishes, W. E. Ribelin, ed. The University of Wisconsin Press, Madison, Wisconsin, 1975. p. 559-584. 2 tab., 18 fig., 26 ref.

Descriptors: *Pathology, *Pesticides, *DDT, *Aroclors, *Chlorinated hydrocarbon pesticides, *Organophosphorous pesticides, Reviews, Data collections, *2,4-D, *Endrin, *Bioassay, *Heptachlor, *Insecticides, *Fish diseases, Herbicides, Rainbow trout, Sunfishes.
Identifiers: *Fish livers, Histology, Lindane, Methoxychlor, Telodrin, Malathion, Dursban, Carbaryl, TFM.

A review of controlled field and laboratory research investigating the pathologic effects of pesticides and related chemicals on the livers of fishes is presented. Few fish and pesticides have been tested which may account for the failure to identify specific syndromes resulting from pesticide exposures. Cutthroat trout exposed to endrin had a large spectrum of lesions constituting a prehepatomatous syndrome. Early necrotic, coagulative lesions were associated with the portal triads of rainbow trout exposed to critical levels of lindane. Bluegills exposed to methoxychlor had unique, eosinophilic globular masses in the liver vascular system. The most commonly encountered nonspecific liver lesion for fish following pesticide exposure was fatty change. Further histological and cytological investigation is indicated to further define and characterize effects of pesticides on the livers of fish and to study possible interactions of variables such as nutrition and pesticides. (Katz)
W77-02695

CELLULAR EFFECTS OF MERCURY ON FISH KIDNEY TUBULES,
B. F. Trump, R. T. Jones, and S. Sahaphong.
In: The Pathology of Fishes, W. E. Ribelin, University of Wisconsin Press, Madison, Wisconsin, 1975. p. 585-612. 1 tab., 17 fig., 25 ref.

Descriptors: *Osmosis, *Inhibition, *Mercury, *Fish physiology, Pathology, *Fish diseases, *Teleosts, *Cytological studies, *Membrane processes, *Permeability, *Biological membranes, Laboratory tests, Analytical techniques, Methodology, Membrane processes, Heavy metals, Water pollution effects.
Identifiers: *Kidney function(Fish).

Kidney function and structure in teleosts is described. Experiments to further describe kidney function, both in vitro and in vivo are presented, including the effects of several mercury compounds on kidney function in vitro. Mercury is believed to bind with SH groups on surface membrane proteins which may inhibit ATPase. Leak may result with leak-in of sodium and leak-out of potassium with subsequent volume shifts in the cell. Calcification of the mitochondria, one important type of nephrocalcinosis, may occur as a result of high sodium concentrations inhibiting mitochondrial respiration. The basic mechanism of mercurial action is probably due to binding to SH groups. The important lesion is probably an interaction involving cell membrane permeability (Katz)
W77-02696

EFFECTS OF TURBIDITY ON VENTILATION RATES AND OXYGEN CONSUMPTION OF GREEN SUNFISH, LEPOMIS CYANELLUS,
North Texas State Univ., Denton. Dept. of Biological Sciences
J. D. Horkel, and W. D. Pearson
Transactions of American Fisheries Society, Vol 105, No. 1, p 107-113, 1976. 5 fig., 2 tab., 10 ref.

Descriptors: *Turbidity, *Suspended solids, Fish behavior, *Fish physiology, *Adaptation, Environmental effects, *Sunfishes, *Oxygen, *Respiration, Water pollution effects, *Temperature, *Oxygen requirements, Aquatic environment, Metabolism, Laboratory tests, Analytical techniques, Fish
Identifiers: *Lepomis cyanellus

Ventilation and oxygen consumption rates of green sunfish exposed to bentonite clay suspensions were measured at several temperatures. Ventilation rates were not affected by bentonite clay suspensions below 2,125 FTU (Formazin Turbidity Units) at 5 C, 1,012 FTU at 15 C, and 898 FTU at 25 C. At turbidity levels exceeding 1,012 FTU at 15 C and 898 FTU at 25 C ventilation rates increased 50-70%. Tests were inconclusive at 35 C due to high mortality. Oxygen consumption rates were not affected by turbid suspensions of up to 3,500 FTU at any of the four temperatures. Evidence suggests that increased ventilation rates under slightly turbid conditions are a means of compensating for reduced respiratory efficiency in order to maintain a constant oxygen uptake. The costs of increased ventilation rates were probably met by a reduction in activity. (Katz)
W77-02697

CONCENTRATIONS AND CONCENTRATION FACTORS OF HEAVY METALS IN BROWN ALGAE,
University Coll. of North Wales, Menai Bridge. Marine Science Labs.
For primary bibliographic entry see Field 5A.
W77-02698

TOXICITY OF THE SURGEON FISHES-II PROPERTIES OF THE PRINCIPAL WATER SOLUBLE TOXIN,
Tohoku Univ., Sendai (Japan). Faculty of Agriculture.
T. Yasumoto, R. Bagnis, and J. P. Vernoux.
Bulletin of the Japanese Society of Scientific Fisheries, Vol 42(3), p 359-366, 1976. 1 tab, 3 fig, 12 ref.

Descriptors: *Toxicity, *Mortality, *Public Health, *Marine biology, *Marine fish, *Toxins, *Algal toxins, *Fish toxins, *Venom, Marine microorganisms, Biochemistry, Bioassay, Pollutant idententification.
Identifiers: *Surgeon fish toxicity, Surgeon fish, Ciguatoxin, Mailotoxin, Ichthytoxin, Phytoflagella, Prymnesium parvum.

Specimens of surgeonfish Ctenochaetus striatus collected in Tahiti contained a water-soluble toxin in addition to ciguatoxin. The water-soluble toxin was tentatively named mailotoxin (MT) after the Tahitian name for surgeonfish maito. Purificat of MT was achievable by the standard purificat procedures for polar lipids. The toxin was elu from a silicic acid column with chlorofo methanol (6:4) and from a cellulose column w chloroform-methanol-water (5:15:1). Upon gel tration through Sephadex G-25, it appeared in fractions near void volume. Acid hydrolysis of toxin afforded fatty acids, glucose and galacto and 15 amino acids. The minimum lethal dose mice by intraparitonial injection was estimated be 15 to 20 mg/kg. Guppies put in 40 ppm solut of MT died within 150 min. These chemical physiological properties indicated a close simil ty of MT to the ichthyotoxin produced by phytoflagellate Prymnesium parvum. (Katz)
W77-02700

STUDIES ON THE METABOLISM CHLOROPHENOLS IN FISH-VI TURNOV OF ABSORBED PHENOL IN GOLDFISH,
Kyushu Univ., Fukuoka (Japan). Lab. of Fishe and Chemistry.
K. Kobayashi, H. Akitake, and S. Kimura.
Bulletin of the Japanese Society of Scient Fisheries, Vol 42, No 1, p 45-50, 2 tab, 2 fig, 6 re

Descriptors: *Toxicity, Bioassay, Freshwa fish, Biochemistry, Animal physiology, *Path pollutants, *Metabolism, Liquid wastes, Labo tory animals, Laboratory tests, Industrial was Organoleptic properties, Taste, *Phenols
Identifiers: *Chlorophenols, Absorbed phe *Goldfish, Excretion, Organ phenol concen tion, Biliary excretion, Tissue concentration.

A study has been made regarding the turnove absorbed phenol in various organs of goldf Carassius auratus, during absorption in a phe medium (15 ppm) and its subsequent excretio running water. Although the absorbed phenol cumulated in various organs, the phenol conc tration in each organ, except gall bladder, was most constant after 2 hr of exposure and rap decreased after transfer of the fish from phenol-medium to running water. The phenol c centration in the gall bladder, however, increa with exposure time, even after fish had been tra ferred to running water, and reached a maxi value of 214.7 microgram/gram at 1-hr cultur running water. The phenol concentration in gall bladder decreased to 144.7 microgram/gra the end of the excretion period (for 24 hr), bu amount accounted for 37% of the total phenol tected. The characteristic accumulation of phe in the gall bladder indicates that the biliary ex tion of phenol from the liver, probably after detoxication by sulfate conjugation, is an imp tant mechanism for the disposition of pheno fish, as well as for that of pentachlorophenol. also W75-10417; W75-10418; W75-10611; W77-02702) (Katz)
W77-02701

STUDIES ON THE METABOLISM CHLOROPHENOLS IN FISH-VII SULFA CONJUGATION OF PHENOL AND PCP FISH LIVERS,
Kyushu Univ., Fukuoka (Japan). Lab. of Fishe and Chemistry
K. Kobayashi, H. Akitake, and S. Kimura.
Bulletin of the Japanese Society of Scient Fisheries, Vol. 42(2), 1976, p 171-177, 1 tab fig., 14 ref.

Descriptors: *Organoleptic properties, Ta *Toxicity, Freshwater fish, Biochemistry, Ani physiology, *Path of pollutants, *Metaboli Laboratory animals, Laboratory tests, Indust wastes, Trout, Carp, Clams, Lobsters, *Phenol
Identifiers: *Chlorophenols, Sulfate, Conjugat Goldfish, Rainbow trout, Spiny lobster, Sh necked clam, Liver, *Pentachlorophenol

The sulfate conjugation of phenol and p tachlorophenol (PCP) in vitro by liver slices

genates from goldfish, carp, rainbow trout, lobster and shortnecked clam has been stu- and compared with that by albino rat liver, 35S-labeled K2S04. All the liver slices of the nimals showed sulfate conjugation activity phenol, the level of activity being 1-30% of n rat liver (approx. 1.8 micro mole/g dry hr). However, the liver homogenates had ac- s which were markedly lower than those n by the liver slices. On the other hand, PCP l to the incubation mixture containing liver not only did not conjugate with sulfate, but ncentrations higher than 1.4 x 10-6M, it in- d the sulfate conjugation of phenol. In short- d clam and goldfish, absorbed PCP is rapidly ted after conjugation with sulfate. (See also 10417; W75-10418; W75-10611; and W77-) (Katz)
02702

ISTENCE OF POLYCHLORINATED ENYLS IN THE HARD-CLAM RCENARIA MERCENARIA) AND THE EF- UPON THE DISTRIBUTION OF THESE LUTANTS IN THE ESTUARINE ENVIRON- T,
on Univ. (England). Dept. of Zoology.
M. Courtney, and G. R. W. Denten.
onmental Pollution, Vol 10, No 1, p 55-64, 2 fig, 5 tab, 23 ref.

riptors: *Clams, *Aroclor, *Polychlorinaed nyls, *Absorption, *Pesticide residues, abolism, *Bioassay, *Persistence, Analytical iques, Mollusks, Invertebrates, *Path of pol- ts, Laboratory tests, Methodology, Distribu-

ifiers: *Bioaccumulation, *Tissue analysis.

enaria mercenaria fed Aroclor 1254 adsorbed the surface of alumina particles at 1.25 and parts/109 seawater for 21 days showed a max- concentration factor of 1.8 x 103 with ral mass:muscular foot residues of less than general. In clean seawater, only the muscu- ot of clams, showed a diminution in PCB nt after six months. PCB levels in visceral muscular foot:surface mud for clams in ampton water are in the ratio of 2:1:2. Tissue les contained relatively more lower inated isomers compared with the Aroclor ard while feces and mud samples showed an ased proportion of higher chlorinated PCB rs. Clams may exert both a qualitative and a itative effect upon the distribution of PCB in tuarine ecosystem. (Katz)
02703

TOPLANKTON PRODUCTION MEASURE- TS WITH CARBON-14 WITH CON- RATION OF LABELED ORGANIC TER LOSSES DURING FILTRATION, (IN IAN),
emiya Nauk SSSR, Leningrad. gicheskii Institut.
rimary bibliographic entry see Field 5A.
02704

ERVATIONS ON GAS BUBBLE DISEASE NG WILD ADULT COLUMBIA RIVER ES,
llis Environmental Research Lab., Oreg. ern Fish Toxicology Station.
Bouck, G. A. Chapman, P. W. Schneider, nd D. G. Stevens.
actions of American Fisheries Society, Vol No 1, p 114-115, 1976. 6 ref.

riptors: Environmental effects, *Fish dis- , Pathology, Dams, *Supersaturation, ogen, *Gases, *Salmonids, *Sockeye Sal- *Salmon, *Trout, Fishkill, Sampling, Sport Bubbles, Commercial fish, *Columbia River.
ifiers: *Gas bubble disease, Emphysema, d, *Steelhead, *Dissolved gases.

A high incidence of gas bubble disease was found among salmonids and shad sampled from the air-supersaturated Columbia River. One sampling in 1972 showed macroscopic dermal emphysema (bubbles) on 47% of sockeye salmon, 40% of steelhead trout (Salmo gairdneri) and 26% of American shad (Alosa sapidissima). No evidence of gas bubble disease was seen on the external surfaces of lampreys. Post-capture eye damage to sockeye salmon, resulting in perforation of the cornea and blindness, may also be related to supersaturation of the river. (Katz)
W77-02705

LEAD UPTAKE IN TWO MARINE PHYTOPLANKTON ORGANISMS,
Scripps Institution of Oceanography, La Jolla, Calif.
M. Schulz-Baldes, and R. A. Lewin.
Biological Bulletin, Vol. 150, p. 118-127, February, 1976. 3 tab., 6 fig., 13 ref.

Descriptors: *Adsorption, *Phytoplankton, *Diatoms, *Lead, *Path of pollutants, *Bioassay, *Food webs, *Food chains, Laboratory tests, Chelation, Membrane processes, Analytical techniques, Pollutants.
Identifiers: *Phaeodactylum, *Platymonas, *Binding sites.

The uptake of lead by Phaeodactylum tricornutum and Platymonas subcordiformis, two marine phytoplankton, exposed to lead concentrations ranging from 0.02 to 0.8 mg/l, occurs in two phases. The first phase was completed within minutes after addition of lead and could be described by a Freundlich adsorption isotherm. The number of binding sites per all seemed to be limited. Cells of Phaeodactylum became 'saturated' when the lead burden reached 11,640 micrograms/gr (dry weight). EDTA added to the solution completely inhibits the uptake of lead by Phaeodactylum cells. When diatom cells, pretreated with lead, are resuspended in EDTA, much of the adsorbed lead is eluted with a longer pre-treatment period leading to a higher lead retention by the cell. This suggests that during prolonged exposure to lead solutions the metal ions are first adsorbed to the cell surface and then translocated to within the cell wall, to the plasma membrane, and then to the cytoplasm. (Katz)
W77-02708

THE MUDDY RUN PUMPED STORAGE PROJECT: A CASE HISTORY,
Ichthyological Associates, Inc., Drumore, Pa.
T. W. Robbins, and D. Mathur.
Transactions of American Fisheries Society, Vol 105, No 1, p 165-176, 1976. 2 fig, 13 ref.

Descriptors: *Pumped storage, *Reservoirs, *Mortality, Powerplants, Ecology, *Fish reproduction, *Sampling, Biomass, Sport fish, Reproduction, Pump turbines, Water quality, Catfish, Sunfishes, Fish populations, Fish eggs, Larval growth stage.
Identifiers: *Muddy Run Pumped Storage Project(Penn), Pomoxis sp, Ictalurus sp, Susquehanna River, Conowingo Pond(Penn).

The ecology of Conowingo Pond and the Muddy Run Pumped Storage Pond on the lower Susquehanna River was studied to determine the effects of the Muddy Run Pumped Storage Station. Nearly all species of fish present in the lower pond appeared in the upper pond. Extensive sampling in both ponds shows no detrimental effects of station operation in the fishes and fisheries of Conowingo Pond. The upper pond serves as an area where biomass of fishes pumped up from Conowingo Pond can be increased. About 6.5 times as many fish larvae were pumped into the upper pond as left during generation. No estimates could be obtained on the percentage mortality of fishes passing through the pump turbines. The mortality of fishes associated with the operation of the pumped storage station appears to be negligible and screens are not needed for protection. (Katz)
W77-02709

LETHAL AND PREFERRED TEMPERATURES OF THE ALEWIFE (ALOSA PSEUDOHARENGUS) IN LAKE MICHIGAN,
Industrial BIO-TEST Lab., Inc., Northbrook, Ill.
R. G. Otto, M. A. Kitchel, and J. O. Rice.
Transactions of American Fisheries Society, Vol. 105, No. 1, p. 96-106, 1976. 4 tab., 7 fig., 16 ref.

Descriptors: *Heated water, *Temperature, Environmental effects, *Juvenile growth stage, *Lethal limit, *Mortality, *Seasonal, *Water temperature, *Fish behavior, *Resistance, Aquatic environment, *Electric powerplants, *Lake Michigan, Laboratory tests, Water pollution sources, Water pollution effects, Thermal water, Powerplants, Fish, Food webs, Water quality.
Identifiers: Acclimation, *Temperature preference, *Alewife, *Alosa sp.

The temperature tolerance and temperature preference of mature and young-of-year alewives from Lake Michigan were studied in the laboratory. Critical thermal maxima and incipient upper lethal temperatures increase with acclimation temperature for both mature and young-of-year fish. Critical thermal maxima at equivalent acclimation temperatures are unaffected by age of the fish. Incipient upper lethal limits for young-of-year fish exceed those for mature fish by 3C to 6C. The ultimate lower lethal temperature for mature alewives appears to exceed 3C. Loss of heat tolerance following a 10C decrease in temperature occurs at approximately one-half the rate of gain of heat tolerance following a comparable temperature increase. Preferred temperatures for young-of-year alewives were consistently higher than those of mature fish. Seasonal factors other than lake temperature appear to be of considerable importance in determining preferred temperatures. The results are discussed in terms of potential effects of the heated plume from a nuclear generating station and available field data. (Katz)
W77-02710

CHANGES IN FISH SPECIES COMPOSITION IN THE AU SABLE RIVER, MICHIGAN FROM THE 1920'S TO 1972,
Institute for Fisheries Research, Ann Arbor, Mich.
J. S. Richards.
Transactions of American Fisheries Society, Vol. 105, No. 1, 3 tab., 6 fig, p. 32-40, 1976.

Descriptors: habitats, *Rainbow trout, *Brown trout, *Brook trout, *Fish populations, Water quality, Environmental effects, *Trout, *Post-impoundment, Rivers, On-site investigations, Population, Aquatic populations, Pre-impoundment impoundments, Sport fish, Methodology, *Michigan.
Identifiers: *Species diversity, *Au Sable River(Mich).

Fish collections taken in the 1920's from the Au Sable River, Michigan, were replicated in 1972. The Au Sable system as a whole has remained a non-rigorous, predictable environment for fish species. Substantial changes in fish species lists have occurred at most stations. The percentage of cold-water species present in the cold-water, moderate flow areas has increased, while species diversity evenness, and numbers of species have remained constant. The warm headwater areas remain unchanged. Below the impoundments and in the large river areas, water quality has changed with subsequent reductions in species diversity and evenness, and large changes in species lists. (Katz)
W77-02712

DDE AND LINDANE IN A LARGE-SCALE MODEL LENTIC ECOSYSTEM,
Purdue Univ., Lafayette, Ind. Dept. of Forestry.
J. L. Hamelink, and R. C. Waybrant.
Transactions of American Fisheries Society, Vol. 105, No. 1, p. 124-134, 1976. 1 fig., 5 tab., 32 ref.

Descriptors: *Sediment-water interfaces, *Model studies, *Path of pollutants, *Pesticides, *DDE, *Pesticide residues, *Lentic environment, *Absorption, *Sunfishes, *Rainbow trout, *Trout, *Persistence, *Sediments, Standing waters, Zooplankton, Chlorinated hydrocarbon pesticides, Food webs, Thermal stratification, Quarries, Insecticides, Analytical techniques, Bass, Bottom sediments.
Identifiers: *Bioaccumulation, *Lindane, *Lepomis sp.

The fate of DDE and lindane added to the epilimnion of a thermally-stratified, flooded limestone quarry was followed for one year. DDE was distributed rapidly throughout the system, due to an influx of sediment generated by a rainstorm, while lindane persisted in the epilimnion until turnover. Concentration factors for zooplankton at equilibrium averaged 33 for lindane and 4.5 x 104 for DDE, while the same values for bluegill were 768 and 1.1 x 105, respectively. Rainbow trout planted 134 days after treatment showed a concentration factor for DDE of 1.8 x 105 within 108 days, even though less than 1 part per trillion of DDE remained in the water. The distributions of DDE and lindane in the system were controlled chiefly by sediment-water interactions. (Katz)
W77-02713

EFFECT OF SHEAR ON EGGS AND LARVAE OF STRIPED BASS, MORONE SAXATILIS, AND WHITE PERCH, M. AMERICANA,
Maryland Univ., Solomons. Chesapeake Biological Lab.
R. P. Morgan, II, R. E. Ulanowicz, V. J. Rasin, Jr, L. A. Noe, and G. B. Gray.
Transactions of American Fisheries Society, Vol. 10, No. 1, p. 149-154, 1976. 3 tab., 1 fig., 13 ref.

Descriptors: *Fish eggs, Larvae, *Larval growth stage, *Lethal limit, *Environmental effects, *Fish reproduction, *Striped bass, *White perch, Shear, Velocity, Stress, *Shear stress, *Mortality, *Fishkill, Immature growth stage, Laboratory tests, Methodology, Marine fish, Ships, Reproduction, Sea basses, Flow, Pathology, Analytical techniques, Canals.
Identifiers: *Morone sp.

Shear stress, generated by water movement, can kill fish eggs and larvae by causing rotation or deformation. Through the use of an experimental apparatus, a series of shear (as dynes per square cm) - mortality equations for fixed time exposures were generated for striped bass and white perch eggs and larvae. Exposure of striped bass eggs to a shear level of 350 dynes per square cm killed 36% of the eggs in 1 min, 69% in 2 min., and 88% in 4 min. Exposure of larvae to the same conditions kills 9.3% in 1 min., 30.0% in 2 min, and 68.1% in 4 min. White perch eggs exposed to a shear level of 350 dynes per square cm were killed at a rate of 38% in 1 min., 41% in 2 min., 89% in 5 min., 96% in 10 min and 98% in 20 min. White perch larvae exposed to the same conditions were killed at a rate of 38% in 1 min., 52% in 2 min., and 75% in 4 min. Results are used in conjunction with the determination of shear levels in the Chesapeake and Delaware Canal and ship movement for the estimation of egg and larvae mortalities in the field. (Katz)
W77-02714

THE SMITH MOUNTAIN - LEESVILLE PROJECT: A CASE HISTORY,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.
G. M. Simmons, Jr.
Transactions of American Fisheries Society, Vol. 105, No. 1, p. 1973-180, 1976. 5 fig., 1 tab., 22 ref.

Descriptors: *Thermal stratification, *Reservoirs, *Powerplants, *On-site investigations, *Primary productivity, *Water quality, *Pumped storage, *Reservoir operation, *Recirculated water, Water treatment, Water circulation, Impoundments, Standing crop, *Virginia, Recycling.
Identifiers: *Smith Mountain-Leesville Project(Va), Roanoke River(Va), Blackwater River(Va).

The Smith Mountain Pump Storage Project consists of two reservoirs in tandem on the Roanoke and Blackwater Rivers approximately 64 km southeast of Roanoke, Virginia. The reservoirs have provided sites for evaluating the impact of pump storage operation on primary productivity, fisheries, and water quality. Due to the location of the dam and the dendritic nature of the basin, the effect of recycling to alleviate detrimental water quality effects caused by thermal stratification were minimal. Moreover, as might be expected, the quality of water found in the upper reservoir depends upon the quality of water being recycled from the lower impoundment. Recycling appears to enhance primary productivity rates, at least in the vicinity of the dam. Pump storage operation does not appear to detract from the fishery in either reservoir. Although comprehensive studies are still needed in many areas, the results of all studies to date indicate a net beneficial effect of pump storage operation on environmental quality. (Katz)
W77-02715

TOXICITY OF WATER-SOLUBLE FRACTIONS OF FOUR TEST OILS FOR THE POLYCHAETOUS ANNELIDS, NEANTHES ARENACEODENTATA AND CAPITELLA CAPITATA,
Texas A and M Univ., College Station. Dept. of Biology.
S. S. Rossi, J. W. Anderson, and G. S. Ward.
Environmental Pollution, Vol. 10, p. 9-17, 1976. 2 fig., 2 tab., 12 ref

Descriptors: *Benthic fauna, *Benthos, *Oil wastes, *Mortality, *Toxins, Pollutants, *Toxicity, *Bioassay, *Annelids, *Bioindicators, *Lethal limit, Laboratory tests, Water pollution sources, Invertebrates, Worms, Environmental effects, Water pollution effects, *Pollutant identification.
Identifiers: *Neanthes sp., *Capitella sp., Polychaetes, Naphthalenes.

The toxicity of water-soluble fractions of two refined and two crude oils to two species of laboratory-reared polychaetes was determined. The two refined oils (No. 2 fuel oil and bunker 'C' residual oil) proved most toxic to both species. South Louisiana crude oil was less toxic than either of the refined oils, yet more toxic than Kuwait crude oil. The higher concentrations of toxic diaromatic compounds (naphthalenes) found in refined oils probably accounted for major differences between the toxicity of refined versus crude oils. Capitella capitata was slightly more sensitive to three of the four oils than was Neanthes arenaceodentata. Both species appear to be similar to fish and crustaceans in their sensitivity to these four oils. (Katz)
W77-02716

COMPARISON OF 115M CD ACCUMULATION FROM SEDIMENTS AND SEA WATERS BY POLYCHAETE WORMS,
National Inst. of Radiological Sciences, Nakaminato (Japan). Marine Radio-Ecological Research Station.
For primary bibliographic entry see Field 5B.
W77-02717

EDWARDSIELLA TARDA FROM EPIZOOTIC OF MULLETS (MUGIL CEPHALUS) IN OKITSU BAY, (IN JAPANESE),
Kochi Univ. (Japan). Dept. of Cultural Fisheries
R. Kusada, T. Toyoshima, Y. Jwamura, and H. Sako.
Bulletin of the Japanese Society of Scientific Fisheries, Vol. 42, No. 3, 1976, p. 271-276, 1 f 12 ref.

Descriptors: *Mortality, *Marine fish, *Mar fisheries, *Animal diseases, *Fish diseas Microbiology, Aquatic microbiology, Marine b teria, Microorganism, Fishkill, *Epizootiology.
Identifiers: *Mullets, Mugil cephalus, Jap *Okitsu Bay(Japan), *Edwardsiella tarda.

During the period from late September thro early October 1973, an epizootic occurred am mullet populations in a bay in Kochi Prefectu Dying fish displayed erratic swimming and a m or less whirling motion at the surface. Affec fish had large malodorous abscesses with hem hagic borders in the body surface. The etiolog agent was isolated from the kidney of disea mullets. These organisms were gram-nega motile peritrichously flagellated rods, not enc sulated, and measuring about 0.8 x 0.4 u. The b teria grew slowly on nutrient agar requiring 4 of incubation at 25C to form the typical small mm in diameter), circular, transparent, slig raised colonies. They gave negative oxidase r tion, positive catalase reaction, utilized gluc fermentatively and reduced nitrate to nitrite. T did not utilize citrate and malonate as a sole bon source. No actions on d-tartrate and muc were exhibited. The organisms were the proc tion of hydrogen sulfide in TSI agar and indol tryptone water positive to methyl red test, n tive to VP reaction, decarboxylation of lysine ornithine, and utilization of fructose, galact mannose and glycerol. They were sensitive streptomysin, kanamycin, chloramphenol, razolidon and nalidix acid. (Katz)
W77-02718

BIOSYNTHESIS OF ORGANIC ARSENIC CO POUNDS IN BROWN TROUT (SALMO TR TA),
Fisheries and Marine Service, St Jo (Newfoundland). Biological Station.
W. R. Penrose.
Journal of the Fisheries Research Board Canada, Vol. 32, p. 2385-2390, 1975. 2 fig., 3 t 15 ref.

Descriptors: *Traces, *Brown trout, *Ars compounds, *Fish physiology, *Path of p tants, *Metabolism, Arsenic radioisoto Laboratory tests, Methodology, Biochemis Organic compounds.
Identifiers: *Biosynthesis.

Radioactive, inorganic arsenic was administ to brown trout (Salmo trutta) orally and by tramuscular injection. The orally administere senic appeared in the tissues in an altered f that is presumed organic, this organoarsenical also found in the gastrointestinal contents. Th jected arsenic appeared in the tissues in inorg form and was only slowly converted to org form. Large amounts of inorganic and organ senic were detected in the bile. These findings consistent with biosynthesis of the organic ars compound within the gastrointestinal tract. (Ka W77-02719

AQUEOUS AMMONIA EQUILIBRIUM CAL LATIONS: EFFECTS OF PH AND TEMPE TURE,
Montana State Univ., Bozeman. Dept. of Che try.
K. Emerson, R. C. Russo, R. E. Lund, and R. V Thurston.
Journal of the Fisheries Research Board Canada, Vol. 32, p. 2379-2383, 1975. 1 tab., 15 r

escriptors: *Ammonia, *Acidity, *Temperature, nalytical techniques, *Reviews, *Hydrogen ion ncentration, *Equilibrium, *Aqueous solutions, athematical models, Toxins, *Toxicity, trogen compounds, Lethal limit.

e toxicity of ammonia to fishes has been at-buted to the un-ionized ammonia chemical spe-es present in aqueous solution. Because the per-nt of total ammonia present as un-ionized am-onia (NH3) is dependent on pH and temperature, exact understanding of the aqueous ammonia uilibrium is important for toxicity studies. A tical evaluation of the literature data on the am-onia-water equilibrium system has been carried t. Results of calculations of values of pKa at dif-ent temperatures and of percent of NH3 in ueous ammonia solutions of zero salinity as a nction of pH and temperature are presented. atz)
77-02720

UDIES ON THE CHEMICAL BEHAVIOR OF 6-RU IN SEA WATER AND ITS UPTAKE BY ARINE ORGANISMS -I, ACCUMULATION ND EXCRETION OF 106-RU BY CLAM,
ational Inst. of Radiological Sciences, akaminato (Japan). Marine Radio-Ecological search Station.
Ishikawa, T. Koyanagi, and M. Saiki.
lletin of the Japanese Society of Scientific sheries, Vol. 42(3), 1976, p. 287-297. 4 tab., 6 ., 9 ref.

escriptors: *Metals, *Path of pollutants, Inver-brates, Mollusks, *Water quality, Sea water, lams, Laboratory tests, *Physiology(Animal), ochemistry, *Absorption, *Radioactivity.
entifiers: *Ruthenium radioisotopes, 106-thenium, Meretrix, Biological half-life, Soft tis-es.

cumulation and excretion of 106-Ru by the m, Meretrix meretrix lusoria, were investigated relation to the chemical forms under laboratory ndition. A little difference in the biological up-ke was observed only when 106-Ru was epared to the chemical form of 106-RuNO.C1x. cumulation seemed to be attributable to the ecific surface area of tissues or the physiological tivities of organs of the clam. Reared for 100 ys, the edible part of the clam represented the lioactivity ratio of 4.9. In general, radioactivity s from the cam was relatively rapid for the emical form of prep'd 106-RuNO.C1x. After 40 ys, approximately 25% of accumulated prep'd 6-Ru was lost from the whole body of the living m. The lost radio-activity, especially in the ini-l experimental stage, was not due to the desorp-n from the shell but to the biological activities of t tissues of the clam. The biological half lives re also discussed in relation to the chemical ms. The loss curves obtained with the whole dy clam consisted of two components, whereas t with the soft tissues were classified into three mponents. (Katz)
77-02722

E ECOLOGY OF AN ARTIFICIAL COOLING KE,
W. Harmsworth.
rhandlungen Internationale Vereigung fur orelische und ungiwandte Limnologie, Vol. 19, 2189-2200, November, 1975, 6 fig., 7 tab., 9 ref.

scriptors: *Temperature, Plankton, oplankton, *Electric powerplants, ytoplankton, *Benthos, *Cooling water, kes, *Artificial lakes, Water quality, On-site in-tigations, *Thermal water, Size, Powerplants, ecreation, Environmental effects, Aquatic pulations, Chlorinated hydrocarbon pesticides, ermal pollution, *Illinois.
ntifiers: *Lake Sangchris(Ill).

In an attempt to clarify the impact of thermal discharges from electric power utilities on aquatic ecosystems, a summary of studies undertaken by a private firm is presented. The history and development of Lake Sangchris in central Illinois as a closed cycle cooling lake is presented as well as the ecology, water chemistry, plankton, benthos and fishery resource. Phytoplankton and zooplankton present in Lake Sangchris were uniformly of small size and eutrophication was not apparent as might be expected from high nutrient levels and temperatures in the lake. The gizzard shad, a filter feeder, is possibly the cause of this situation. Benthic populations increased perhaps due to discontinued use of chlorinated pesticides by farmers. The fishery in Lake Sangchris consists of 18 species which includes native species as well as largemouth bass and channel catfish which were stocked. The lake is successfully used not only as a cooling system, but also for recreation. (Katz)
W77-02723

SOME ENVIRONMENTAL AND TOXICOLOGICAL ASPECTS OF TRI-ARYL PHOSPHATE SYNTHETIC OIL,
R. Wageman.
Verhandlungen Internationale Vereinigung fur Theoretische und ungewandle Limnologie, Vol 19, p 2178-2184, November, 1975. 3 fig, 3 tab, 6 ref.

Descriptors: Oil, *Toxicity, *Phosphates, *Water pollution effects, *Bioassay, *Rainbow trout, *Oil pollution, *Hydrolysis, Environmental effects, Oil spills, *Oil wastes, Laboratory tests, Chemical degradation, *Phosphorous compounds, Water pollution sources.
Identifiers: *Tri-aryl phosphate oil, *Synthetic oil.

A synthetic oil, tri-aryl phosphate, was examined, as a representative of synthetic oils used in industry, for its toxicity to fish and for its rate of hydrolysis in river water. A commercial synthetic tri-aryl phosphate oil with the brand name IMOL S-140 was used. A half-life of 96 days was obtained and the resulting production of phosphate was negligibly small. Toxicity tests with guppies showed that IMOL was not acutely toxic but long-term exposure of four months produced symptoms of chronic-poisoning in rainbow trout. Enlarged livers developed, internal tissue turned blue-gray and enzyme activities of LDH and GOT increased abnormally. (Katz)
W77-02724

AVOIDANCE OF LIME-NEUTRALIZED IRON HYDROXIDE SOLUTIONS BY COHO SALMON IN THE LABORATORY,
Pittsburgh Univ., Pa. Dept. of Civil Engineering.
K. F. Updegraff, and J. L. Sykora.
Environmental Science and Technology, Vol. 10, No. 1, p. 51-54, January, 1976. 2 tab., 3 fig., 10 ref.

Descriptors: *Salmon, *Fish behavior, *Environmental effects, *Water quality, *Acidic water, *Water pollution effects, Salmonids, Laboratory tests, Fish, Iron, Bioassay, Hydrogen ion concentration, Methodology, Water quality, *Acid mine water, *Coal mine wastes, *Iron oxides.
Identifiers: *Coho Salmon, *Avoidance(Fish).

Laboratory avoidance studies showed that coho salmon raised in clean water exhibit a definite response to lime-neutralized iron hydroxide suspensions at the range of 4.25-6.45 mg Fe/1. The same species of fish, exposed to different concentrations of the pollutant for several months, responded in almost the same way as control fish. (Katz)
W77-02725

PLANKTON INVESTIGATIONS NEAR FLEVO POWER STATION,
F. B. J. Koops.
Verhandlungen Internationale Vereingung fur theroelische and ungewandte humnulogie, Vol. 19, p. 2207-2213, November, 1975. 2 tab., 5 fig., 1 ref.

Descriptors: *Diatoms, *Plankton, *Powerplants, *Temperature, *Cooling water, *Aquatic populations, *Plant populations, *Environmental effects, Primary productivity, Methodology, Phytoplankton, Aquatic microorganisms.
Identifiers: Diatoma sp., *Asterionella sp., Mechanical damage.

Changes in species composition of plankton around the Flevo power station in the Netherlands were investigated with special attention to Asterionella formosa and Diatoma elongatum. No correlation between water temperature and the number of species found or between water temperature and relative abundance was observed. Microscopic examinations of samples showed no apparent increase in the number of dead or damaged cells. (Katz)
W77-02726

CHLORINE-CONTAINING STABLE ORGANICS: NEW COMPOUNDS OF ENVIRONMENTAL CONCERN,
C. W. Gehrs, and R. L. Jolley.
Verhandlungen Internationale Vereinigungfur Theoretische und ungewandte Limnologie, Vol. 19, p. 2185-2188, November, 1975. 3 fig., 5 ref.

Descriptors: *Organic compounds, Resistance, *Chlorination, *Pesticide residues, *Lethal limit, *Food chains, *Food webs, Environmental effects, *Daphnia, *Bioassay, *Reproduction, *Mortality, Pollutants, Plankton, Aquatic life, Water purification, Chlorine, Water pollution sources.
Identifiers: *Sublethal effects, 4-chlororesorcinol, 5-chlorokuvacil.

Chlorine-containing stable organics are formed when chlorine is added to water containing high concentrations of organics. Maturation and survival of Daphnia magna were evaluated after exposure to several concentrations of two chlorine-containing stable organics. A dose-response relationship was found with all concentrations of 4-chlororesorcinol with increased concentrations causing a decrease in time to LC50. Survival was not affected by 5-chlorouracil at concentrations tested. Reproduction was inhibited by 4-chlororesorcinol and stimulated at lowest concentrations for 5-chlorouracil. (Katz)
W77-02727

MACROZOOBENTHIC SPECIES ASSEMBLAGES OF SOUTHEASTERN LAKE MICHIGAN, U.S.A.,
For primary bibliographic entry see Field 2H.
W77-02728

EFFECTS OF SELECTED WATER TOXICANTS ON THE IN VITRO ACTIVITY OF FISH CARBONIC ANHYDRASE,
National Water Quality Lab., Duluth, Minn.
G. M. Christensen, and J. H. Tucker.
Chemical-Biological Interactions, Vol. 13, p. 181-192, 1976. 11 fig., 1 tab., 49 ref.

Descriptors: *Enzymes, *Inhibitors, Biochemistry, *Kinetics, Water quality, *Heavy metals, *Mode of Action, Water pollution sources, *Respiration, Laboratory tests, Analytical techniques, Cations, Pesticides, Organic compounds, Toxins, Channel catfish, DDT, Mercury, Cadmium, Diazinon.
Identifiers: *Carbonic anhydrase, Sevin, Lindane.

Carbonic anhydrase (CA, carbonate hydro-lyase EC 4.2.1.1) from lysed red blood cells of the channel catfish (Ictalurus punctatus) was studied to determine physico-chemical kinetic properties and relative sensitivity to 56 chemicals of significance

in water quality research. In general, enzyme activity was strongly reduced by heavy metal inorganic cations; less strongly by organometallic cations, some anions, and certain pesticides; and weakly inhibited by light metal cations and organometallic and organic compounds. Dose-response curves were qualitatively similar in most cases. (Katz)
W77-02730

BIOACCUMULATION OF MERCURY IN MYOXOCEPHALUS QUADRICORNIS (L.) (TELEOSTEI, COTTIDAE) IN AN UNPOLLUTED AREA OF THE BALTIC,
Helsinki Univ. (Finland). Dept. of Environmental Science.
P. Nuorteva, and E. Hasanen.
Ann. Zool. Fennici, Vol. 12, p. 247-254, 1975, 1 fig., 4 tab., 48 ref.

Descriptors: *Mercury, *Path of pollutants, *Absorption, *Sculpins, Environmental effects, Habitats, *Food webs, Analytical techniques, Invertebrates, *Marine fish, Methodology, Size, Metabolism, Teleosts.
Identifiers: *Myoxocephalus quadricornis, *Bioaccumulation, Tissue analysis, *Baltic Sea(Bromarv area).

The mercury content of organisms in the unpolluted Bromarv area of the Baltic ranged from 0.03 ppm in invertebrates to 0.29 ppm in the flesh of piscivorous fishes to 2 ppm in the flesh of fish-eating migratory birds. The mercury content of the stenothermal fish, Myoxocephalus quadricornis increased with size to a maximum of 0.47 ppm. Observations from an area moderately polluted with mercury showed an accelerated accumulation of mercury. This indicates that the balanced natural condition of mercury circulation is characterized by regression coefficients near zero. The exceptionally stron bioaccumulation of mercury by M. quadricornis is probably a result of its feeding on mysids which have a higher mercury content than other invertebrates. (Katz)
W77-02731

BIOCHEMICAL EFFECTS OF METHYLMERCURIC CHLORIDE, CADMIUM CHLORIDE, AND LEAD NITRATE ON EMBRYOS AND ALEVINS OF THE BROOK TROUT, SALVELINUS FONTINALIS,
National Water Quality Lab., Duluth, Minn.
G. M. Christensen.
Toxicology and Applied Pharmacology, Vol. 32, 1975, p. 191-197, 2 tab., 18 ref.

Descriptors: *Mercury, Cadmium, Lead, Freshwater fish, Physiology, Bio-chemistry, *Brook trout, Growth rates, Growth stages, Proteins, Water pollution, *Water pollution effects, *Path of pollutants, *Toxicity, *Bioassays, Enzymes, Life cycles, *Chlorides, *Nitrates.
Identifiers: Biochemical responses, Salvelinus fontinalis, *Methylmercuric chloride, *Cadmium chloride, *Lead nitrate.

Brook trout (Salvelinus fontinalis) embryos and alevins were exposed to methylmercuric chloride (0.010-1.03 ppb of Hg), cadmium chloride (0.035-3.43 ppb of Cd), and lead nitrate (plumbous, 0.057-530 ppb of Pb) as a part of a study to evaluate biochemical responses to three important water pollutants during early stages of life. After exposures of 16-17 days for embryos and continuing to 21 days after hatching for alevins, biochemical analyses were carried out. The factors measured were weight, protein, glutamic oxaloacetic transaminase, alkaline phosphatase, acetylcholine esterase and adenosine-5'-triphosphate (ATP). A statistical evaluation ($p<0.05$) of the results from control and exposed specimens showed one change for embryos: a decrease in GOT activity in response to 1.03 ppb of CH3Hg(II). Thirteen changes were found for alevins: a decrease in weight in response to CH3Hg(II), Cd(II), and Pb(II); an increase in protein content in response to Cd(II); an increase in GOT activity in response to CH3Hg(II) and Cd(II); an increase in ALP activity in response to Cd(II) and Pb(II); and an increase in ACH activity in response to Cd(II) and Pb(II). (Katz)
W77-02732

THE EFFECTIVENESS OF THE FINNISH ANTI-MERCURY MEASUREMENTS IN THE MODERATELY POLLUTED AREA OF HAMEENKYRO, (IN FINNISH),
Helsinki Univ. (Finland). Dept. of Environmental Science.
P. Nourteva, E. Hasanen, and S. L. Nourteva.
Ymparisto ja Terveys, 1975, Vol. 6, No. 8, p. 611-635, 7 tab., 29 ref.

Descriptors: *Mercury, Metals, *Path of pollutants, Water pollution effects, *Public health, Freshwater fish, Water pollution control, Pathology, Biochemistry, Neutron activation analysis, *Human diseases, Human pathology, Insects, *Pulp wastes, Pulp and paper industry, *Heavy metals.
Identifiers: *Methylmercury, *Finland, Mercury transfer, Sarcophagous flies, Mercury half life.

The reduction of use of mercury slimicides in pulping operation in Finland has resulted in a decrease of tissue mercury content in fresh-water fish of about 0.2 ppm/year. Decrease in the mercury content of hair in the people who had stopped eating fish was observed. The mercury content of sarcosoprophagous flies reared in fish with different degrees of mercury contamination was observed. (Katz)
W77-02733

POLYHALOGENATED MONOTERPENES FROM THE RED ALGA, PLOCAMIUM CARTILAGINEUM,
Scripps Institution of Oceanography, LaJolla, Calif.
J. S. Mynderse, and D. J. Faulkner
Available from the National Technical Information Service, Springfield, VA 22161 as PB-246 871, Price codes: A02 in paper copy, A01 in microfiche.
Tetrahedron, Vol 31, 1975, p 1963-1967, 1 tab, 2 fig, 11 ref.

Descriptors: *Rhodophyta, Mollusks, Organic compounds, *Chlorinated hydrocarbons, Polymers, Algae, *Biochemistry, *Chemical analysis, Spectroscopy, *Bromine, *Halogens, Chlorine, *Plant physiology, Plant growth substances, *Marine algae, California.
Identifiers: *Polyhalogenated monoterpenes, Plocamium cartilagineum, *Sea hare, Aplysia californica, Digestive gland, Molecular formulas.

Mixtures of polyhalogenated monoterpenes, first observed among the constituents of the digestive gland of the sea hare Aplysia californica, have been isolated from Plocamium species. The structures of eleven polyhalogenated monoterpenes from Plocamium cartilagineum have been determined by spectroscopic methods. All structures are based on the 3,7-dimethyl-1,5,7-octatriene skeleton. (Katz)
W77-02734

EFFECTS OF WATER QUALITY ON LARVAL SETTLEMENTS IN LOS ANGELES HARBOR AS DETERMINED BY MULTIVARIATE STATISTICAL TECHNIQUES,
University of Southern California, Los Angeles. Allan Hancock Foundation.
D. F. Soule, R. R. Emerson, J. D. Soule, R. W. Smith, and M. Oguri.
IEEE Ocean, p. 913-918, 1975. 3 tab., 3 fig., 11 ref.

Descriptors: *Dissolved oxygen, *Temperature, *Salinity, Water quality, *Larvae, *Turbidity, Hydrogen ion concentration, Analytical techniques, *Statistical methods, *Distribution, Environmental effects, Water pollution effects, On-site data collections, Monitoring, *California, Primary productivity, Distribution patterns, Spatial distribution, Larval growth stage.
Identifiers: *Los Angeles Harbor(Calif).

Settling racks placed at different locations in Los Angeles Harbor and representing a variety of water quality conditions were monitored for larval settlement over a two year period. Temperature, salinity, pH, dissolved oxygen, primary productivity, nitrates, nitrites, NH3 and sediment chemistry were determined. Multivariate statistical techniques were applied in order to define the major physical parameters affecting larval distribution and settlement. The major abiotic parameters which contribute to the environmental gradient within the study area were temperature and dissolved oxygen. Higher temperatures and lower dissolved oxygen levels within the inner harbor were modified with incoming seawater from the outer and outside harbor areas. Secondary factors include turbidity and salinity. (Katz)
W77-02735

PLANKTON PHOTOSYNTHESIS AND DEGRADATION IN THE KAPCHAGAI RESERVOIR IN THE THIRD YEAR OF ITS EXISTENCE, (IN RUSSIAN),
Akademiya Nauk Kazakhskoi SSR, Alma-Ata. Inst. of Microbiology and Virology.
N. K. Gulaya, and N. L. Tyuten'Kova.
Gidrobiol Zh 11(3), p 43-46, 1975.

Descriptors: *Plankton, *Photosynthesis, *Productivity, Degradation(Decomposition), Reservoirs, *Biodegradation decomposing organic matter.
Identifiers: Kapchagai reservoir(Kazakh-SSR, USSR.

Photosynthetic production and degradation of organic matter in the Kapchagai reservoir in the Alma-Ata district of the Kazakh SSR (USSR) have been determined regularly since it was first filled in 1970. The results of the 3rd survey, carried out in May, July and Oct. 1972, are given. In all seasons degradation exceeds plankton photosynthesis. In spring degradation is almost twice production. In summer degradation and production are about the same. In fall degradation exceeds production by a factor of 1.5.—Copyright 1976 Biological Abstracts, Inc.
W77-02737

COMPUTERIZED SCHEME FOR THE IDENTIFICATION OF AEROMONADS AND MEMBERS OF THE FAMILY ENTEROBACTERIACEAE,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5A.
W77-02758

NTA (NITRILOTRIACETIC ACID) - AN ECOLOGICAL APPRAISAL,
Environmental Protection Service, Ottawa (Ontario).
For primary bibliographic entry see Field 5B
W77-02770

A BENTHIC SURVEY OF FLAT CREEK AND THE SALT RIVER NEAR THAYNE, WYOMING,
Environmental Protection Agency, Denver, Colo. Technical Support Branch
Available from the National Technical Information Service, Springfield, VA 22161 as PB-245 80
Price codes: A02 in paper copy, A01 in microfich
Report No. SA/TSB-14, February 1973. 16 p. fig., 6 tab.

criptors: *Benthos, *Organic wastes, Rivers, ductivity, *Wyoming, Dissolved oxygen, age effluents, Mayflies, Caddisflies, ochaetes, Midges, Aquatic insects, *Farm es, Dairy industry.
tifiers: *Dairy wastes, Flat Creek(Wyo), Salt r(Wyo), Thayne(Wyo), Blackflies.

pling results showing the effects of dairy ge and whey discharges on stream benthic munities (Ephemeroptera, Tricoptera, Plecop- Hemiptera, Coleoptera, Diptera, ochaetes, and Annelida) are presented. The on immediately adjacent to the outfall was red with a thick layer of congealed whey for oximately 50 yards downstream, with a sig- ant reduction of all organisms--the result of mothering effect of the whey. At 300 yards nstream, large increases in the average ber of mayflies, blackflies, and midges were rved, due to the enrichment of the sewage on of the effluent, as evidenced by substantial ases in organic carbon, total nitrogen, and phorus. Two miles downstream from the arge, the quantity of mayflies, blackflies, and es was significantly higher than the upstream ol station. The only evident detrimental ef- of the effluent was the smothering by the con- d whey at the station closest to the discharge, no blanketing effect was observed at the nstream stations. The reduction of dissolved en from an average of 8.0 mg/l at the control n to an average of 5.7 mg/l at the second pling station did not produce gross detrimental ts on the benthic community. (Auen-Wiscon-

-02807

TIAL AND TEMPORAL VARIATIONS IN INTERSTITIAL WATER CHEMISTRY OF SAPEAKE BAY SEDIMENTS,
s Hopkins Univ., Baltimore, Md.
atisoff, O. P. Bricker, G. R. Holdren, and P. k.
lable from the National Technical Informa- Service, Springfield Va 22161, as COO 327 Price codes: A02 in paper copy, A01 in ofiche. Report CONF-750410-7 (undated). 16 fig., 24 ref. AEC AT(11)-3292.

riptors: *Chemical properties, *Chesapeake *Bottom sediments, Estuaries, *Temporal bution, *Spatial distribution, Oxidation ction potential, Hydrogen ion concentration, rides, Alkalinity, Sulfates, Phosphates, Iron, onia, Silicates, Manganese, Cores, Bicar- tes.

analyses to calculate the chemical mass ce relations in estuaries based on spatial and oral variability of the concentrations of dis- d species in the sediment, and their interac- , are described. Data reliability is contingent navigational accuracy which limits relocation mple sites and variations in temperature, ty, and sediment deposition rates, which are ndent on time cycles, and which, in turn, in- ce both the biological and inorganic sses taking place within the cores. The oxida- eduction potential, hydrogen ion concentra- hloride, silicate, sulfate, carbonate alkalini- mmonia, phosphate, iron and manganese were lated and compared to the analytical iques. The spatial variations were only ly greater than the limits set by the analytical iques. However, groundwater infiltration can ly affect the interstitial water chemistry and be an important influence in some areas; also istribution of some chemical species is con- d by local mineral equilibria, which decreases producibility of spatial data. Temporal varia- greatly exceeded the limits of spatial varia- for each chemical specie. For parameters are conservative and/or influenced minantly by incrganic activity, seasonal es in salinity and temperature control the in- ial water profiles. Those species which are involved in the decomposition of organic matter also showed a gross seasonal correlation. (Auen-Wisconsin)
W77-02808

ON THE HABITABILITY OF MARS, AN APPROACH TO PLANETARY ECOSYNTHESIS.
Ames Research Center, Moffett Field, Calif.
For primary bibliographic entry see Field 6G.
W77-02810

CONCENTRATIONS OF COPPER, IRON, LEAD, NICKEL AND ZINC IN FRESHWATER ALGAL BLOOMS,
University Coll. of Swansea (Wales). Dept. of Botany and Microbiology.
For primary bibliographic entry see Field 5A.
W77-02813

NITROGEN IN SEDIMENTED ORGANIC MATTER FROM LAKE ONTARIO,
Canada Centre for Inland Waters, Burlington (Ontario).
A. L. W. Kemp, and A. Mudrochova.
In: Proceedings of the International Meeting on Humic Substances, Nieuwersluis, Netherlands, 1972, p. 137-157. 9 fig., 10 tab., 47 ref.

Descriptors: *Nitrogen compounds, *Lake Ontario, *Lake sediments, Amino acids, Humic acids, Analysis, Fulvic acids, *Organic matter, *Nitrogen, Water pollution effects.

Preliminary results of an ongoing study to determine the nature of the nitrogenous fraction of sedimented organic matter from Lake Ontario indicated that the insoluble, combined amino acids account for 45% of the total nitrogen in the bottom sediments; combined amino sugars (10%), fixed ammonium nitrogen (6%) and exchangeable ammonium-N (2%) comprise the balance of the known nitrogen compounds, leaving about 36% of the nitrogen which cannot be identified. The sediment contained three times more fulvic than humic acids, both of which are extractable in dilute sodium hydroxide. The distribution of individual protein and non-protein amino acid residues in the humic and fulvic acids on a relative basis is similar to that found in the whole sediment, in algae, zooplankton, and bacteria. Furthermore the relative abundance of amino acid residues found in the sediments is close to that reported for several Canadian soil types, except for a rather high nitrogen content, which, it is theorized, is due to the relatively larger protein content of the lake's seston. Infra-red spectra suggested the presence of polypeptides as well as proteins and polysaccharides. The polypeptide nature of the sediment fulvic acids and combined soluble amino acids was also suggested by the release of free amino acids with a proteolytic enzyme. (Auen-Wisconsin)
W77-02815

EVALUATION OF THE PHYTOPLANKTON BIOMASS IN LAKES OF THE WORLD, (IN RUSSIAN),
Belorussian State Univ., Minsk (USSR).
For primary bibliographic entry see Field 2H.
W77-02816

THE EFFECT OF DISSOLVED ORGANIC MATTER IN SEA WATER ON THE UPTAKE OF MIXED INDIVIDUAL HYDROCARBONS AND NUMBER 2 FUEL OIL BY A MARINE FILTER-FEEDING BIVALVE (MERCENARIA MERCENARIA),
Rhode Island Univ., Kingston. Graduate School of Oceanography.
P. D. Boehm, and J. G. Quinn.
Estuarine and Coastal Marine Science, Vol. 4, No. 1, p. 93-105, 1976. 5 fig., 1 tab., 31 ref. R803415-01-0.

Descriptors: *Organic matter, *Sea water, *Oil, *Clams, *Absorption, Solubility, Aromatic compounds, Organic compounds, Dissolved solids.
Identifiers: *Dissolved organic matter, Number 2 fuel oil.

The presence of naturally-occuring dissolved organic matter (DOM) in sea water significantly inhibits the uptake by the clam (Mercenaria mercenaria) of certain saturated hydrocarbons. In laboratory studies, the bivalves were placed in test solutions consisting of seawater in which n-hexadecane, phenanthrene and No. 2 fuel oil were mixed. One test solution contained seawater which had been treated with activated charcoal to reduce the DOM content. Clams which had ingested the seawater with reduced DOM content underwent a statistically significant increase in hexadencane uptake, a 17-fold increase in the uptake of the 'saturated' fraction of the fuel oil and a 5-fold increase in the uptake of the 'aromatic' fraction. However, there was no variance in the test results in phenanthrene. Average uptake of the total fuel oil hydrocarbon was seven times greater for the bivalves in the reduced-DOM test. The results suggest that DOM in seawater solubilizes saturated hydrocarbons and makes them less readily taken up by the clams. (Harris-Wisconsin)
W77-02817

PROBLEMS IN THE MONITORING OF BIOMASS,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5A.
W77-02818

EFFECTS OF PASSAGE THROUGH POWER PLANT COOLING SYSTEMS ON ESTUARINE COPEPODS,
Maryland Univ., Solomons. Chesapeake Biological Lab.
D. R. Heinle.
Environmental Pollution, Vol. 11, No. 1, p. 39-58, 1976. 3 fig., 11 tab., 20 ref.

Descriptors: *Water pollution effects, *Powerplants, *Copepods, *Chesapeake Bay, Entrainment, Cooling water, Intakes, *Maryland, Chlorine, Heated water, Analytical techniques, Sampling.

The effects of chlorination, heated water, and entrainment on the copepods Scottolana canadensis, Eurytemora affinis and Acartia tonsa, at three power plant sites in Chesapeake Bay were measured by vital staining, a technique that allowed the examination of more individual organisms for viability or mortality. The Vienna plant (located at the Nanticoke River) with the greatest temperature rise, highest absolute temperatures, lowest salinities, and no chlorination, caused no detectable mortalities. At the Clark Point plant (located on the Patuxent River) there were slight mortalities with no chlorination and substantial mortalities occurred only during chlorination. At the Morgantown site (located in Maryland below the Route 301 bridge across the Potomac River estuary) significant mortalities occurred only when chlorine was used. In addition to the slight mortalities caused by temperature alone and the clear effects of chlorine, the data suggested a difference in sensitivity of the three species. In order of increasing sensitivity they are: S. canadensis, E affinis and A. tonsa. The statistical problems associated with precise estimates of numbers of organisms passing through the Morgantown plant are presumed to be due to inadequate sampling efforts and the lack of prior knowledge of the copepod distribution. (Auen-Wisconsin)
W77-02820

CHEMICAL AND PHOTOCHEMICAL TRANSFORMATION OF SELECTED PESTICIDES IN AQUATIC SYSTEMS,
Environmental Research Lab., Athens, Ga.

N. L. Wolfe, R. G. Zepp, G. L. Baughman, R. C. Fincher, and J. A. Gordon.
Report No. EPA-600/3-76-067, September 1976. 151 p. 58 fig., 29 tab., 206 ref. 1BA609.

Descriptors: *Chemical reactions, *Pesticides, *Herbicides, Hydrolysis, Oxidation, Reduction(Chemical), Chemical degradation, Agricultural runoff, Water quality control, Aquatic habitats, Aquatic environments.
Identifiers: *Photochemical reactions, *Photochemical transformation processes, *Malathion, *Carbaryl, *Methoxychlor, *Captan, *2,4-D esters, Photolysis, Direct photolysis, Sensitized photolysis, Photooxygenation.

Laboratory data are given to help assess the relative importance of various chemical and photochemical transformations for nine selected pesticides under conditions expected in aquatic ecosystems. Reaction processes studied include hydrolysis and oxidation-reduction among the chemical processes, and direct photolysis, sensitized photolysis and photooxygenation involving singlet oxygen among the photochemical processes. Measured rate constants, half-lives and other data are given for the transformation of malathion, carbaryl, methoxychlor, captan and 2,4-D esthers. Less-complete data are given for atrazine, diazinon, parathion and toxaphene. Transformation processes considered likely to be environmentally important in water, and calling for intensive further research, are chemical degradation for malathion, hydrolysis of 2,4-D esters in basic water and photolysis in acidic water, sensitized photolysis of methoxychlor in natural waters, sensitized photooxidation of captan in river water and hydrolysis of carbaryl in basic waters. Studies in greater detail are needed for sensitized photolysis of pollutants in natural waters, for delineation of sediment associated hydrolysis and for the role of oxidative processes in natural waters. (Harris-Wisconsin)
W77-02822

ANALYSIS OF EMISSIONS FROM OUTBOARD TWO CYCLE MARINE ENGINES,
Michigan Univ., Ann Arbor.
For primary bibliographic entry see Field 5B.
W77-02823

TEMPORAL VARIATIONS IN THE PHOSPHORUS CONTENT OF A NORTHERN DYSTROPHIC LAKE,
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
J. W. McMahon, and A. E. Docherty.
Report No. AECL-5103, March 1975. 14 p. 4 fig., 1 tab., 14 ref.

Descriptors: *Phosphorus, Tracers, Streams, Lakes, *Canada, *Dystrophy, Thermocline, Epilimnion, Hypolimnion, Cycling nutrients, Temperature, Input-output analysis, Entrainment, Water pollution effects.
Identifiers: *Nutrient budget, Upper Bass Lake(Ontario), Chalk River(Ontario).

Concentrations of total and soluble phosphorus (TP,SP) entering and leaving a small dystrophic lake via streams, together with its subsequent distribution in the lake, were determined using radioisotope tracer techniques. Sampling was done during the summer stagnation period when temporal variations were thought to be in a 'pseudo-steady state' condition. Results indicate that both TP and SP concentrations increased with time at all depths, with more pronounced increases in the hypolimnion. Soluble and total phosphorus increased from 8.5 and 16 ug/l in surface waters in May to 17.0 and 35.0 ug/l by September, while the bottom meter of water showed an increase from 20 and 45 ug/l in May to 85 and 112 ug/l respectively in September. Between May and August, approximately 65% of the TP and 50% of the SP input via streams was retained by the lake. Total phosphorus increases of 1.4 kg in the epilimnion compartment and 2.5 kg in the hypolimnion were reported, while net stream input was estimated at 3.1 kg. It is suggested that this 25% difference of the estimated TP budget was primarily due to precipitation input, because of the close relationship between weekly precipitation values and the concentration of phosphorus entering the lake. A process of partial phosphorus entrainment was also observed. (Luedtke-Wisconsin)
W77-02824

TROPHIC CLASSIFICATION OF LAKES USING LANDSAT-1 (ERTS-1) MULTISPECTRAL SCANNER DATA,
Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5A.
W77-02825

ENVIRONMENTAL INVENTORY AND ASSESSMENT OF NAVIGATION POOLS 24, 25, 26, UPPER MISSISSIPPI AND LOWER ILLINOIS RIVERS: AN AQUATIC ANALYSIS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Environmental Effects Lab.
For primary bibliographic entry see Field 5A.
W77-02826

THE CAPACITY OF SALT MARSH VEGETATION TO MODIFY THE QUALITY OF ESTUARINE WATERS,
Rhode Island Univ., Kingston. Dept. of Plant and Soil Science.
For primary bibliographic entry see Field 2L.
W77-02830

PAPERS OF A SEMINAR ON EARLY WARNING SYSTEMS FOR TOXIC SUBSTANCES, CONFERENCE REPORT,
Battelle Memorial Inst., Seattle, Wash.
For primary bibliographic entry see Field 5A.
W77-02835

ENVIRONMENTAL STRESSOR MATRIX SYSTEM FOR EARLY WARNING,
Battelle Columbus Labs., Ohio.
For primary bibliographic entry see Field 5A.
W77-02837

AN INCIDENT OF INDUSTRIALLY RELATED TOXIC PERIPHERAL NEUROPATHY,
National Inst. for Occupational Safety and Health, Cincinnati, Ohio.
For primary bibliographic entry see Field 5A.
W77-02838

ESTABLISHING ENVIRONMENTAL PRIORITIES FOR SYNTHETIC ORGANIC CHEMICALS: FOCUSING ON THE NEXT PCBS,
Syracuse Univ. Research Corp., N. Y.
For primary bibliographic entry see Field 5A.
W77-02839

REVIEW OF HEALTH/ENVIRONMENTAL SYSTEMS WITH POTENTIAL EARLY WARNING APPLICATIONS,
Battelle-Columbus Labs., Ohio.
For primary bibliographic entry see Field 5A.
W77-02841

A RESEARCH PROGRAM TO ACQUIRE AND ANALYZE INFORMATION ON CHEMICALS THAT IMPACT ON MAN AND HIS ENVIRONMENT,
Stanford Research Inst., Menlo Park, Calif.
For primary bibliographic entry see Field 5A.
W77-02842

NATIONAL CANCER INSTITUTE PROGRA OF CANCER SURVEILLANCE, EPIDEMIOL GY AND END RESULTS REPORTING (SE PROGRAM),
National Cancer Inst., Bethesda, Md. Biome Branch.
For primary bibliographic entry see Field 5A.
W77-02843

A COST-RISK-BENEFIT ANALYSIS OF TOX SUBSTANCES,
Environmental Protection Agency, Washingt D. C.
For primary bibliographic entry see Field 5G
W77-02844

THE WORLD HEALTH ORGANIZATION'S I VIRONMENTAL HEALTH CRITERIA AND A MONITORING PROGRAMS,
National Environmental Research Cen Research Triangle Park, N. C.
For primary bibliographic entry see Field 5G.
W77-02845

PUBLIC INTEREST METHODS FOR SESSING CHEMICAL HAZARDS,
Center for Science in the Public Interest, Wash ton, D. C.
A. J. Fritsch
In: Papers of a Seminar on Early Warning Syst for Toxic Substances, held on January 30-Feb ry 1, 1974, at Battelle Research Center, Sea Washington (EPA-560/1-75-003, July 1975). p 201.

Descriptors: *Chemicals, *Public health, *Tox *Toxicity, *Social aspects, *Legal aspe *Legislation, Water pollution effects, Indus wastes, Air pollution, Hazards
Identifiers: *Public interest groups, Consu groups, Lobbyists, Community groups, Envi mental groups, Public participation.

A method is described by which coopera public interest groups may work for the detec and assessment of chemical hazards through of an intuitive-based and nonsystematic pre- system which relies heavily on cooperation an various public groups, accessibility of infor tion, credibility to the public and flexibility of proach. A public interest group with lim resources must rely on intuition to decide w potential hazards require their immediate eff and which ones can be left to later attention. N samples are submitted to independent laborato for analysis. Once the initial screening completed, intuitive-based subjective judgem is again applied to decide on the seriousness of suspected malady, the number of persons posed, anticipated increases in use of the stance, types of regulation required, and alte tives which can be easily substituted wit undue disruption to the national economy. If tion is decided upon, the public interest group then play the role of a lobbyist in government universities and the press. Examples in w prealert warning methods have been applie clude: asbestos, gasoline additives and aer sprays. (See also W77-02835) (Harris-Wiscons
W77-02846

EARLY-WARNING SYSTEM FOR TOXIC S STANCES: HUMAN HEALTH ASPECTS,
National Environmental Research Ce Research Triangle Park, N. C.
For primary bibliographic entry see Field 5A.
W77-02847

A LABORATORY MODEL ECOSYSTEM AS ELEMENT IN EARLY-WARNING SYST FOR TOXIC SUBSTANCES,
Illinois Univ. at Urbana-Champaign. Inst for vironmental Studies
For primary bibliographic entry see Field 5A.

-02848

CTERIAL DEGRADATION OF YCHLORINATED BIPHENYLS II. RATE DIES,
ada Centre for Inland Waters, Burlington ario).
. S. Wong, and K. L. E. Kaiser.
etin of Environmental Contamination and icology, Vol. 13, No. 2, p. 249-256, 1975. 3 fig., f.

criptors: *Microbial degradation, ychlorinated biphenyls, *Bacteria, Re- nce, Aroclors, Laboratory tests, Pseu- onas, *Biodegradation.
tifiers: Achromobacter, Aroclor 1221, clor 1242, Aroclor 1254.

chlorinated biphenyls (Aroclor 1221, 1242 and) at concentrations up to 0.1% in glucose did inhibit growth of lake water bacteria; there even a slight growth stimulation by Aroclor and 1242, as the bacteria used these com- nds as sole carbon and energy sources, but not clor 1254. Less than 1% of lake water bacteria, ever, possess this ability. Seven bacterial iso- from Aroclor agar plates were identified; five nged to Achromobacter sp. and two were domonas sp. The Aroclor 1221 mixture was pletely degraded into several low molecular ht compounds after one month incubation. the degradation studies of the PCB isomers e major components--biphenyl, 2-chloro-, and lorobiphenyl were condensed in separate col- rs. The test results indicated that the ability of eria to degrade 0.05% solutions of these com- nts were similar to the utilization of the clor 1221 mixture. Not only does chlorination ne biphenyl retard the bacterial degradation, the position of the chlorine atom in the ene ring is a determining factor for the adation rate of the two monochlorobiphenyls. also W75-02859) (Auen-Wisconsin)
-02851

THEMERAL VARIATION OF THE TOPLANKTON IN CAMPECHE BAY, XICO, (IN SPANISH),
ersidad Nacional Autonoma de Mexico, Mex- City. Instituto de Biologia.
antoyo, and M. Signoret.
Latinoam Microbiol 17(3), p 161-167, 1975.

riptors: *Variability, *Phytoplankton, ctuations, Population, Dinoflagellates, xico, Bays.
tifiers: Nitzschia longissima, *Nycthemeron, oflagellate, Thalassionema nitzschioides, assiothrix frauenfeldii, Laguna de Terminos, mpeche Bay(Mex).

hemeral phytoplankton fluctuations were ated in Campeche Bay near Laguna de Ter- s. Qualitative and quantitative variations registered for the levels of 0, 10, 20 and 30 m . Fluctuations of populations were analyzed e species Nitzchia longissima, Thalassionema chioides and Thalassiothrix frauenfeldii and d dinoflagellate and phytoflagellate groups.-- right 1976, Biological Abstracts, Inc.
-02854

TOPLANKTON OF THE LAGUNA SALADA ADJACENT AREA, VERACRUX TEMBER, 1973), (IN SPANISH),
ersidad Nacional Autonoma de Mexico, Mex- ity. Instituto de Biologia.
ntoyo, and M. Signoret.
Latinoam Microbiol 17(3), p 169-173, 1975.

riptors: *Phytoplankton, *Environment, En- mental effects, *Mexico.
ifiers: *Laguna, Salada(Mex), Veracruz, coenosis.

A preliminary study of phytoplankton of the Laguna Salada and adjacent area is presented. Qualitative and quantitative aspects of this taxocoenosis were registered as well as some environmental factors.--Copyright 1976, Biological Abstracts, Inc.
W77-02859

A COMPARATIVE WATER QUALITY ANALYSIS OF SELECTED RECREATION LAKES AND STREAMS IN THE WHITE MOUNTAINS OF ARIZONA,
Arizona Univ., Tucson. School of Renewable Natural Resources.
For primary bibliographic entry see Field 5B.
W77-02866

WATER QUALITY EFFECT OF DIKING A SHALLOW ARID-REGION LAKE,
Brigham Young Univ., Provo, Utah.
D. K. Fuhriman, L. B. Merritt, J. S. Bradshaw, and J. R. Barton.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-241 984, Price codes: A11 in paper copy, A01 in microfiche. Report EPA-660/2-75-007, April, 1975. 235 p, 7 fig, 9 tab, 28 ref, 2 append. EPA Program Element 1BB045. R-801400.

Descriptors: *Dikes, *Evaporation control, *Water conservation, *Reservoir evaporation, *Computer models, Water quality, Arid lands, Lakes, Inflow, Outflow, Utah, Methodology, Salts, Water resource development, Water management(Applied), Springs, Barriers, Diversion structures, Leaching.

Natural waters of arid regions contain great quantities of dissolved minerals, mainly because the watershed soils of streams in arid areas have not been subjected to the greater precipitation and natural leaching which has occurred for centuries in humid areas. These minerals remain as residue in storage reservoirs in increasingly greater concentrations. Most of the water 'used' is taken from the waters of basins by evaporative processes (evaporation loss) and serves no immediate beneficial purpose. Studies conducted to find means of reducing evaporative loss have concentrated on application of a protective material on water surfaces. This study was concerned with reducing the surface area of Utah Lake by diking off two bays and reducing the surface area by one-third. A computer model was used to determine the changes in lake water volume and salt concentrations. The diking of Utah Lake will result in salvaging water and improving water quality. The computer simulation model developed as part of this project may be used to predict water quality improvements and quantity savings which may result from diking of lakes at any location. (Jamail-Arizona)
W77-02871

OBSERVATIONS OF THE DAILY DYNAMICS OF PRIMARY PRODUCTION OF PHYTOPLANKTON, (IN RUSSIAN),
Kishinev State Univ. (USSR).
V. M. Shalar', and A. A. Untura.
Gidrobiol Zh 11(3), p 46-48, 1975.

Descriptors: *Primary productivity, Productivity, *Phytoplankton, *Photosynthesis, Plankton, Bodies of water, Scenedesmus.
Identifiers: Ankistrodesmus angustus, Ankistrodesmus spp, Bottle techniques, Cyclotella spp, Scenedesmus quadricauda, Strephanodiscus spp, Kuchurgan liman, Moldavian SSR, USSR.

Observations on the daily dynamics of phytoplankton photosynthesis were carried out simultaneously with a determination of the peimary production of the Kuchurgan liman (Moldavian SSR) and certain adjacent water bodies with 24-h exposure of the bottles. The determination of primary production by the light and dark bottle technique with 24-h exposure yielded understated results, especially in water with abundant phytoplankton. Since during the day the process of photosynthesis occurs with a different intensity, for a correct determination of primary production with high phytoplankton concentrations the bottles should be exposed for 1-2h and the values obtained during 24h summed. Data are given for Cyclotella spp., Ankistrodesmus spp., Stephenodiscus spp., Scenedesmus quadricauda and A. Angustus.--Copyright 1976, Biological Abstracts, Inc.
W77-02872

THE POTENTIAL TRACE METAL CONTAMINATION OF WATER RESOURCES THROUGH THE DISPOSAL OF FLY ASH,
Notre Dame Univ., Ind. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W77-02873

1976 ENVIRONMENTAL CONDITIONS RELATIVE TO SHRIMP PRODUCTION IN COASTAL LOUISIANA,
Louisiana Wildlife and Fisheries Commission, New Orleans. Div. of Oysters, Water Bottoms and Seafoods.
B. B. Barrett, and E. J. Ralph.
Technical Bulletin No. 21, July 1976, 20 p, 13 fig, 4 tab, 8 ref.

Descriptors: *Environmental effects, *Temperature, *Salinity, *Rainfall, Rivers, Shrimp, Commercial shellfish, Commercial fishing, Harvesting, Estuarine environment, Estuaries, *Louisiana.

Relationships between shrimp harvest and river discharge, rainfall, salinity, water temperature and the available amount of nursery area are discussed. The environmental data is presented through April 1976 and indicates favorable condition for a good brown shrimp harvest. Water temperatures have been mild and rainfall and river discharge have been unusually low causing higher than average salinities. Salinities of 10 ppt and above have provided over 2 million acres of nursery area (the largest amount of April nursery area since 1967). (Chilton-ORNL)
W77-02876

AN INVENTORY AND STUDY OF THE LAKE PONTCHARTRAIN-LAKE MAUREPAS ESTUARINE COMPLEX,
Louisiana Wildlife and Fisheries Commission, New Orleans, Div of Oysters, Water Bottoms and Seafoods.
J. W. Tarver, L. B. Savoie, and B. B. Barrett.
Technical Bulletin No. 19, January 1976, 159 p, 24 fig, 56 tab, 5 append, 55 ref.

Descriptors: *Ecology, *Limnology, Biology, Hydrology, Water chemistry, Sedimentology, Aquatic life, Wildlife, Vertebrates, Invertebrates, Plankton, Mollusks, Management, *Louisiana, Estuaries, *Estuarine environment.
Identifiers: *Lake Pontchartrain, *Lake Maurepas(La).

The purpose of the study was to investigate the composition, general distribution, and abundance of fauna inhabiting the Lake Pontchartrain-Lake Maurepas estuarine complex in order to enable administrators to efficiently manage Louisiana's renewable coastal zone resources. Included in the report are sections concerned with area description, biology, hydrology and water chemistry, and sedimentology. The biology section lists data on vertebrates and invertebrates collected in trawl and seine samples, zooplankton distribution and abundance, and mollusks collected in Peterson samples. Temperature, salinity, water chemistry, and dissolved and suspended solids are given detailed attention in the section on hydrology and water chemistry. The water bottoms of the two

lakes were found to be sediments of finer grain size than most other coastal water areas in Louisiana. This was believed to be due to the deposition of large quantities of similar sized particles by the floodwaters of 1973. (Chilton-ORNL)
W77-02879

EMBRYONIC DEVELOPMENT, EARLY GROWTH, AND MERISTIC VARIATION IN RAINBOW TROUT (SALMO GAIRDNERI) EXPOSED TO COMBINATIONS OF LIGHT INTENSITY AND TEMPERATURE,
Ontario Ministry of Natural Resources, Sault Ste. Marie. Fish and Wildlife Research Branch.
W. Kwain.
Journal of the Fisheries Research Board of Canada, Vol. 32, No. 3, 1975, p 397-402, 3 fig, 1 tab, 16 ref.

Descriptors: *Environmental effects, *Temperature, *Light, Fish, *Embryonic growth stage, Growth rates, *Rainbow trout, Reproduction.
Identifiers: *Meristic variations.

Optimum conditions for embryonic development of rainbow trout was found to be between 7 and 10 C and at 0.2 and 20 lx. Deviation from these conditions resulted in high mortality. Embryos were found to be tolerant of temperatures between 3 and 15 C and light intensities less than 400 lx. The study demonstrated that effect of light intensity and temperature on embryonic development is additive, and that light intensity and temperature can act singly and independently of the level of other factors. Differences in growth rates were studied at 10 and 3 C and at light intensities of 20, 2, and 0.2 lx. The higher temperatures always coincided with the higher growth rate. Fish grew slower at low light intensities than those at higher light intensities. Meristic variations were positively correlated with the embryonic development rate. (Chilton-ORNL)
W77-02881

RECENT PROGRESS ON THE CONTROL OF OVARIAN DEVELOPMENT AND INDUCED SPAWNING OF THE GREY MULLET (MUGIL CEPHALUS L.),
Oceanic Inst., Waimanalo, Hawaii.
C. M. Kuo, and C. E. Nash.
Aquaculture, Vol. 5, 1975, p 19-29, 5 fig, 3 tab, 13 ref.

Descriptors: *Environmental effects, *Temperature, *Light, Fish reproduction, Spawning, Photoperiodism, *Mullets.
Identifiers: *Gonadotropins, Grey mullets.

The induction of ovarian maturation out of season by manipulation of photoperiod and temperature cycle is reported. The factor of photoperiod initiated vitello-genesis of ovarian oocytes with a photoperiod of 6L/18D effectively triggering the ovarian development out of season. Best results for grey mullet occurred under constant temperature control of 21C. Fish held at a temperature range of 17-21C were induced to spawn by injections of purified salmon pituitary gonadotropin and larvae were raised through metamorphosis. (Chilton-ORNL)
W77-02882

ROLE OF STOCK BIOMASS AND TEMPERATURE IN RECRUITMENT OF SOUTHERN GULF OF ST. LAWRENCE ATLANTIC COD, GADUS MORHUA,
Fisheries and Marine Service, St. Andrews (New Brunswick). Biological Station.
P. F. Lett, A. C. Kohler, and D. N. Fitzgerald.
Journal of the Fisheries Research Board of Canada, Vol. 32, No. 9, 1975, p 1613-1627, 9 fig, 67 ref.

Descriptors: *Environmental effects, *Reproduction, *Eggs, Biomass, *Gulf of St. Lawrence, Temperature, Population, *Canada.
Identifiers: Recruitment, *Atlantic cod, Gadus morhua.

The stock recruitment mechanism for Gulf of St. Lawrence cod is reported to be primarily dependent upon the population biomass with the effects of temperature being of secondary importance. Density-dependent growth and fecundity act simultaneously in providing a coarse population regulatory mechanism. The fine tuning of the system is the reliance of demersal juvenile abundance on coincident population biomass and related numbers of larvae. It was concluded that there can be no clear relationship between parent stock biomass and subsequent recruitment in a two-dimensional Cartesian system. (Chilton-ORNL)
W77-02883

BARATARIA BASIN: SALINITY CHANGES AND OYSTER DISTRIBUTION,
Louisiana State Univ., Baton Rouge. Center for Wetland Resources.
V. R. Van Sickle, B. B. Barrett, L. J. Gulick, and T. B. Ford
WLFC Technical Bulletin No. 20, Sea Grant Publication No. LSU-T-76-002, May, 1976. 22 p, 8 fig, 3 tab, 58 ref, append

Descriptors: *Environmental effects, *Salinity, *Oysters, Commercial shellfish, Shellfish farming, Temperature, Water pollution, Population, Productivity, *Louisiana, Distribution.
Identifiers: *Barataria Basin(La).

Environmental factors affecting oyster population and the history of oyster production in the Barataria Basin, are discussed. Data shows that distribution of oysters is directly related to salinity and that mortalities resulting from predation and disease are often associated with increased levels of both salinity and temperature. Comparison of data accumulated over the past 20 years shows a trend towards increased levels of salinity in the Barataria estuary with a resulting northward movement of oyster producing areas. Problems arising from encroaching pollution levels from the north pose a real threat to oyster production in the Barataria Basin. (Chilton-ORNL)
W77-02884

EFFECTS OF TREE GROWTH NEAR SMALL WATERWAYS OF MUENSTER ON VEGETATION IN WATER AND ON SLOPES WITH RESPECT TO MAINTENANCE OF THOSE WATERWAYS, (IN GERMAN),
Bundesanstalt fuer Vegetationskunde, Naturschutz und Landschaftspflege, Bonn-Bad Godesberg (West Germany).
For primary bibliographic entry see Field 4A.
W77-02887

EFFECT OF SOME INTEGRAL COMPONENTS OF DETERGENTS ON THE BEHAVIOUR, MORTALITY AND DAMAGE OF GILLS OF THE LARVAE OF THE SPECIES RHYACOPHILA FASCIATA HAG. (TRICHOPTERA), (IN SERBO-CROATIAN),
Zagreb Univ. (Yugoslavia). Inst. of Zoology.
I. Habdija.
Glas Repub Zavoda Zast Prir Prir Muz Titogradu 8, p 51-59, 1975.

Descriptors: *Detergents, Larvae, Water pollution effects, Toxicity, Mortality, Sodium compounds, Organic compounds.
Identifiers: *Rhyacophila-fasciata, *Yugoslavia, Tetrapropylene benzosulfonate, Sodium metasilicate, Trichoptera.

The branchial damage caused by concentrations of 10, 25 and 50 mg/l of tetrapropylene benzol-sulfonate and sodium metasilicate and their toxic e
fects on the behavior and mortality of R. fasc
larvae were studied. Abnormal behavior und
laboratory conditions resulted from all concent
tions of tetrapropylene benzolsulfonate but m
tality and branchial damage after 5 days were p
portional to the concentration. Sodium meta
icate produced no toxic effects. (These studies
relevant to detergent pollution of natural waters
Yugoslavia.)--Copyright 1976, Biological A
stracts, Inc.
W77-02893

**KRAFT MILL WASTES AND THEIR TOXICI
FOR AQUATIC ORGANISMS, (IN RUSSIAN),**
Biologo-Geograficheskii Nauchno-Issledovatel
Institut, Irkutsk (USSR).
Ya. M. Grushko, O. M. Kozhova, and D. I. Ston
Gidrobiol Zh 11(5), p 118-125, 1975.

Descriptors: Toxicity, Pulp wastes, Indust
wastes, Water pollution effects, Fish, Daphn
Odor, Lethal limit, Phenols, Carp, Perch, Tro
Salmon, Aquatic animals.

Data from a review of the literature is presen
on the effect of various toxic substances contai
in kraft mill wastes on aquatic organisms (f
(minnow, guppy, carp, perch, roach, trout, r
bow trout, salmon) and Daphnia) and concen
tions of phenolic compounds in waste liquors
are lethal, toxic or impart an unpleasant odor
taste to fish.--Copyright 1976, Biological A
stracts, Inc.
W77-02894

**EXPERIMENTAL, CLINICAL A
PHYSIOLOGICAL DATA FOR SUBSTANTI
ING THE LOWER LIMITS OF T
MINERALIZATION OF DESALINATED DRIN
ING WATER, (IN RUSSIAN),**
Moskovskii Gosudarstvennyi Meditsinskii Inst
(I).(USSR). Dept. of Public Hygiene.
Yu. A. Rakhmanin, A. I. Bokina, V. P. Plugin, T
A. Grishelevich, and R. I. Mikhaliova.
Gig Sanit 7, p 16-22, 1975.

Descriptors: *Potable water, Mineral
*Desalination, *Public health, Lethal li
*Metabolism, Water quality standards, Water
lution, Saline water.

Distillate and weakly mineralized waters ca
changes in water-salt metabolism (humans
dogs) and in the related homeostasis indices
therefore cannot be used for drinking purpo
The lower limit of mineralization of desalina
water should be 100 mg/l; the lower limit of the
timal total content of salts should be 200 mg/l. T
applies mainly to the desalinated drinking wate
the sodium-chloride-sulfate type.--Copyright 19
Biological Abstracts, Inc.
W77-02895

**STUDY ABOUT THE TOXIC ACTION OF Z
ON ONE SUMMER OLD CARP: I. LETH
CONCENTRATIONS, (IN BULGARIAN),**
Sofia Univ. (Bulgaria). Faculty of Biology;
Sofia Univ. (Bulgaria). Dept. of Zoology.
V. Tishinova.
God Sofii Univ Biol Fak 67(1), p 107-110, 197
(1975).

Descriptors: *Carp, Fish, *Toxicity, Water po
tion effects, *Lethal limit, *Zinc, Summer

A 1-summer-old-carp, weight 30 g, length 10-12
was investigated. The toxic concentrations
Zn2+(ZnSO4) for 96 h were established
water used had pH 6.5, temperature 17-18C,
hardness 1.5 and dissolved oxygen 3-4 mg/l.
data of the experiments were calculated by
Litchfield and Wilcoxon method. The 24 and
LC50's(mg/l) were 36.4 (32.07-42.31) and
(16.85-27.18), respectively; the LC10's were

3.44-30.19) and 12.8 (9.55-17.15); the LC90's ere 50.3 (44.32-57.09) and 36.2 (27.01-48.87). The summer-old carp bears higher concentrations of n in comparison with other fish.--Copyright 1976, iological Abstracts, Inc.
77-02896

ELECTION OF STRAINS IN INVESTIGA-IONS FOR HYGIENIC STANDARDIZATION F THE BACTERIAL COMPOSITION OF RINKING WATER, (IN RUSSIAN),
oskovskii Gosudarstvennyi Meditsinskii Institut) (USSR).
. S. Belakovskii.
g Sanit 12, p 72-75, 1975.

escriptors: *Potable water, *Bioindicators, Bac-ria, Public health, *Water quality standards, E li, *Salmonella, Mortality, Chlorine, Microor-nisms, Water pollution effects.
entifiers: Salmonella-paratyphi, Salmonella-ty-imurium.

ie differences in the survival and Cl resistance of rains of microorganisms (Escherichia coli, Sal-onella paratyphi B, S. typhimurium) from a stan-rd culture collection and of microorganisms iso-ed from environmental objects (wild strains) are significant; both can be used in bacteriological periments. In experiments for hygienic stan-rdization of drinking water quality the standard rains should be used, since they yield compara-e results in experiments conducted by different vestigators, which is impossible with strains iso-ed from various environmental objects.--Copy-ht 1976, Biological Abstracts, Inc.
77-02900

ENTIFICATION OF ACID-CONTAINING RACTION OF ODORANTS OF NATURAL ATER, (IN RUSSIAN),
kademiya Nauk URSR, Kiev. Inst. of Colloidal iemistry and Water.
r primary bibliographic entry see Field 5A.
77-02901

EASTS AND FUNGI IN MARINE ENVIRON-ENTS, (IN FRENCH),
ntre Hospitalo-Universitaire-Poitiers (France).
b. of Bacteriology.
r primary bibliographic entry see Field 5B.
77-02904

UDY OF SANITARY PROBLEMS IN CON-CTION WITH INTER-BASIN TRANSFER OF VER RUNOFF, (IN RUSSIAN),
uchno-Issledovatelskii Institut Gigieny, oscow (USSR).
S. Gurvich, Yu. V. Novikov, and M. M. ifutdinov.
g Sanit 12, p 62-65, 1975.

scriptors: Public health, *Inter-basin transfers, vers, Runoff, *Water pollution effects, iversion, Withdrawal, Engineering structures, ater quality control.

e diversion of large volumes of water from one in to another located in a different geographic ie changes the hydrology and water quality. draulic engineering structures built for water hdrawal and diversion change the sanitary con-ons. Investigation and prevention of adverse itary consequences are discussed.--Copyright 6, Biological Abstracts, Inc.
7-02905

FECT OF HEAT-EXCHANGE WATERS OF A ATE REGIONAL ELECTRIC POWER PLANT CONDITIONS OF WATER USE BY THE PULATION, (IN RUSSIAN),
merovo State Medical Inst. (USSR).
r primary bibliographic entry see Field 5G.
7-02906

EXPERIMENTAL SUBSTANTIATION OF THE MAXIMUM ALLOWABLE CONCENTRATION OF DIMIDE IN WATER BODIES, (IN RUSSIAN),
Academy of Medicine, Sofia (Bulgaria). Center for Hygiene.
S. Novakova, and S. Dinoeva.
Gig Sanit 12, p 75-78, 1975.

Descriptors: *Herbicides, *Organoleptic properties, Odor, Taste, Biochemical oxygen demand, Toxicity, *Lethal limit, Water quality standards, Rodents.
Identifiers: *Dimide, Diphenamid.

The herbicide dimide (diphenamid) affects the organoleptic properties (odor and taste) of water. Its threshold concentration with respect to taste is 6 mg/l and with respect to odor 8 mg/l. Dimide in a concentration up to 48 mg/l does not inhibit biochemical O2 demand processes. A dimide concentration of 4 mg/kg (80 mg/l) was inactive for warm-blood animals (rats) under conditions of a chronic sanitary-toxicological experiment. A concentration of dimide of 6 mg/l is proposed as the maximum allowable in water bodies.--Copyright 1976, Biological Abstracts, Inc.
W77-02907

THE GENERAL CHARACTER OF THE WATER OF THE MIDDLE OF THE SAALE RIVER, (IN GERMAN),
For primary bibliographic entry see Field 5B.
W77-02910

THE BIOMASS AND PRODUCTION OF THE MACROBENTHOS OF THE MIDDLE COURSE OF THE SAALE RIVER, (IN GERMAN),
D. Floessner.
Limnologica 10(1), p 123-153, 1976.

Descriptors: *Biomass, *Benthos, *Productivity, *Diptera, Water pollution, Rivers.
Identifiers: Ancylus-fluviatilis, Asellus-aquaticus, Asellus-coxalis, Gammarus-pulex, Herpobdella-octoculata, Hydropsyche-angustipennis, Hydropsyche-sp, Rhyacophila-nubila, *Saale River(E. Germany).

Quantitative studies on the macrobenthos of the Saale River at 6 localities between Eichicht and Grossheringen (East Germany) made from Feb.-Oct. 1971 and from March-Aug. 1972. Chironomidae predominated everywhere and Gammarus pulex was abundant between Eichicht and Fischersdorf; Herpodella octoculata, Asellus and Hydropsyche angustipennis were dominant in the lower, more polluted sections. Rheophilic insects were commonly only at Fischersdorf. Pollution with sewage reduced the number of species. The biomass was lowest in late winter and early spring and highest in mid-summer. The important productive species were G. pulex at Eichicht, G. pulex, Rhyacophila nubila and Hydropsyche sp. at Fischersdorf and H. octoculata, Asellus aquaticus, A. coxalis and H. angustipennis from Rotherstein to Grossherigen. Ancylus fluviatilis was also important at Maua.--Copyright 1976, Biological Abstracts, Inc.
W77-02912

THE GROUNDWATER FAUNA OF THE SAALE RIVER DRAINAGE AREA (THURINGIA), (IN GERMAN),
Zentralinstitut fuer Mikrobiologie und Experimentelle Therapie, Jena (East Germany).
D. Ronneberger.
Limnologica 9(3), p 323-419, 1975.

Descriptors: Rivers, Surveys, *Drainage basins, Aquatic animals, *Distribution, Data collections, Europe, Water pollution effects, Groundwater, Diptera, Ecology.
Identifiers: Acarina, Amphipoda, Aranea, Archi-annelida, Candona-Eremita, Candonna-Hertzogi, Chilopoda, Cladocera, Coleoptera, Cyclopoida, Diplopoda, Gastropoda, Harpacticoida, Hydrozoa, Hymenoptera, Isopoda, Nematoda, Oligochaeta, Ostracoda, Pelecypoda, Pleistocene, Pseudoscorpiones, Rotatoria, Syncarida, Thuringia, Thysanoptera, Turbellaria, *Saale River(E. Germany).

A survey of the groundwater fauna of the Saale river drainage of Thuringia, East Germany yielded 2 spp. of Hydrozoa, 5 spp. of Turbellaria, 4 spp. of Rotatoria, 32 spp. of Nematoda, 1 sp. of Archiannelida, 2 spp. of Oligochaeta, 2 spp. of Cladocera, 12 spp. of Ostracoda, 14 spp. of Cyclopoida, 20 spp. of Harpacticoida, 2 spp. of Syncarida, 6 spp. of Amphipoda, 2 spp. of Isopoda, 15 spp. of Acarina, 1 sp. Pelecypoda, 3 spp. of Gastropoda, 1 sp. of Chilopoda, 2 spp. of Diplopoda, 1 sp. of Thysanoptera, 6 spp. of Coleoptera, 3 spp. of Hymenoptera, 1 sp. of Diptera, 1 sp. of Pseudoscorpiones and 5 spp. of Araneae. Candona eremita and C. hertzogi are new for East and West Germany. Localities, distributional data, bibliographic citations and accompanying species are given. Geological, geographical and hydrological data are included for the Orla, Schwarza and Roda river areas studied and the important stygophilic, stygobiontic and stygoxenic species are geographically and geographically discussed. The sections of the stream could not be clearly distinguished on the basis of ecological characteristics. The age and origin of the recent subterranean fauna are discussed. Terminology is proposed for a fragmented ecosystem (dialeimmal). The present distribution of the stygobiontic species is explained with reference to the Pleistocene river systems of Europe and the effects of the ice age. Possibilities for evaluating aquatic fauna by analyzing the subterranean organisms are also discussed. It is also possible to evaluate the effects and severity of pollution on the basis of the stygobiontic, stygophilic and stygoxenic species found.--Copyright 1976, Biological Abstracts, Inc.
W77-02913

DISTRIBUTION OF AMPHIPODA IN THE DNIESTER ESTUARY AND ITS POSSIBLE CHANGES IN CONNECTION WITH THE REGULATION OF THE DNIESTER RIVER, (IN RUSSIAN),
Institute of Biology of the Southern Seas, Sevastopol (USSR).
I. I. Greze, A. G. Krastskaya, and Z. A. Ponomareva.
Zool Zh 54(11), p 1723-1726, 1975.

Descriptors: Biomass, *Distribution, Estuaries, Salinity, Regulation, Seasonal, Water pollution, Rivers.
Identifiers: *Amphipods, Biomass, Corophiidae, *Dniester estuary(USSR), Gammaridae, Gmelina-kusnetzowi, USSR.

Amphipods in the Dniester estuary (USSR) are represented by Gammaridae (23 spp.) and Corophiidae (7 spp.). Gmelina kusnetzowi (Sow.) is recorded for the 1st time in the estuary. The occurrence of gammarids in different regions of the estuary characterized by different salinity changes from 17-51% and that of corophiids from 40-90%. In the norther and middle regions where the salinity changes only slightly and does not exceed 3.4%, the Caspian amphipods predominate. Seasonal dynamics is characterized by increased population density and biomass during spring-summer and a decrease during autumn-winter. Salinization of the estuarine waters due to the hydroconstruction may result in changes in composition and distribution of amphipods.--Copyright 1976, Biological Abstracts, Inc.
W77-02914

STUDY OF PERIPHYTON PRODUCTIVITY IN THE NOVOSIBIRSK RESERVOIR, (IN RUSSIAN),
Akademiya Nauk SSSR, Novosibirsk. Central Siberian Botanical Garden.

G. D. Levadnaya.
Izv Sib Otd Akad Nauk Sssr Ser Biol Nauk 3, p 32-38, 1975.

Descriptors: *Periphyton, *Productivity, Reservoirs, *Photosynthesis, Algae, *Biomass.
Identifiers: *Novosibirsk Reservoir(USSR), USSR.

A study of periphyton productivity was made using the glass slide method in 1962 (in the USSR). The production rate high in July; biomass was 1580 mg/10 cm2. Photosynthetic activity of periphyton algae (6.2 mg O2/10 cm2) reached a maximum in June. The coefficient PB/(production/biomass) was 0.12. Turnover was 8.5 days.--Copyright 1976, Biological Abstracts, Inc.
W77-02915

PRIMARY PRODUCTION AND OXYGEN BUDGET IN A STREAM OF THE CENTRAL PYRENEES, (IN FRENCH),
Toulouse-3 Univ. (France). Laboratoire d'Hydrobiology.
J. Capblancq, and P. Lavandier.
Ann Limnol 11(2), p 189-201, 1975.

Descriptors: *Primary productivity, *Dissolved oxygen, *Organic matter, Metabolism, Streams, Degradation(Decomposition), Decomposing organic matter, Water pollution, Shrubs, Ecosystems.
Identifiers: *France(Pyrenees streams).

Comparisons of changes in the dissolved O2 concentration between upstream and downstream stations was used to estimate primary production in a small stream at a mean altitude in the Pyrenees (France). Decomposition processes greatly exceeded gross primary production. The reduction in illumination by the shrubs on the bank, the large input of organic material at the time of the autumnal fall of leaves, and the progressive silting coupled with the absence of floods appeared to be the chief factors responsible for the metabolism of this ecosystem. In spite of some limiting factors (low variations is dissolved O2, strong diffusion, short retention time, input through drainage), the upstream-downstream comparative method can provide some valid estimates of production. The principal causes of error are analyzed.--Copyright 1976, Biological Abstracts, Inc.
W77-02916

ON THE LIVING ENVIRONMENT FOR FISH IN THE COASTAL WATERS SURROUNDING THE NEW AND OLD VOLCANIC ISLAND 'NISI-NO-SIMA', (IN JAPANESE),
Tokyo Univ. of Fisheries (Japan). Lab. of Research and Training Vessel Shinyo-maru.
T. Kido.
J Tokyo Univ Fish 61(1/2), p 59-63, 1975.

Descriptors: Surveys, *Water pollution effects, Coasts, Islands, *Fish, *Fish habitats, Environment, Asia.
Identifiers: *Japan, Nisi-No-Sima, *Volcanic ash.

In March, 1974 observations were carried out as a part of the survey of the volcanic island 'Nisi-no-Sima' to determine the effect of the eruption of a new volcano 'Nisi-no-Sima-Sin To' on fish in the coastal waters of the islands (Japan). Numerous fishes were caught by angling in the water off the W coast of the old island where the clean ocean water lapped the shore directly. Very few were caught on the E coast of the new island where the water contained volcanic materials ejected from the new volcano. The habitat for fish in the coastal region has been destroyed directly as well as indirectly by the eruption of the new volcano, though the damaged area may be small.--Copyright 1976, Biological Abstracts, Inc.
W77-02917

A RECONNAISSANCE OF THE EFFECTS OF A FOREST FIRE ON WATER QUALITY IN KINGS CANYON NATIONAL PARK, CALIFORNIA,
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-02973

LAKE ERIE INTERNATIONAL JETPORT MODEL FEASIBILITY INVESTIGATION; APPLICATION OF THREE-DIMENSIONAL HYDRODYNAMIC MODEL TO STUDY EFFECTS OF PROPOSED JETPORT ISLAND ON THERMOCLINE STRUCTURE IN LAKE ERIE,
Case Western Reserve Univ., Cleveland, Ohio. Dept. of Earth Sciences
For primary bibliographic entry see Field 2H
W77-02994

THE EFFECT OF RIVER FLUCTUATIONS RESULTING FROM HYDROELECTRIC PEAKING ON SELECTED AQUATIC INVERTEBRATES AND FISH,
Idaho Univ., Moscow. Water Resources Research Inst
For primary bibliographic entry see Field 5G
W77-03000

STANDARD TEST FISH DEVELOPMENT. PART I. FAT-HEAD MINNOWS (PIMEPHALES PROMELAS) AND GOLDFISH (CARASSIUS AURATUS) AS STANDARD FISH IN BIOASSAYS AND THEIR REACTION TO POTENTIAL REFERENCE TOXICANTS,
Minnesota Univ., St. Paul. Dept. of Entomology, Fisheries and Wildlife.
For primary bibliographic entry see Field 5A.
W77-03002

STANDARD TEST FISH DEVELOPMENT. PART II: CHRONIC TOXICITY OF GUTHION TO THE FATHEAD MINNOW (PIMEPHALES PROMELAS REFINESQUE),
Minnesota Univ., St. Paul. Dept. of Entomology, Fisheries and Wildlife.
For primary bibliographic entry see Field 5A.
W77-03003

TEMPERATURE EFFECTS OF CRUDE OIL IN THE UPPER INTERTIDAL ZONE,
University of Southern California, Los Angeles. Allan Hancock Foundation.
D. Straughan.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-255 956. Price codes: A04 in paper copy, A01 in microfiche. Environmental Protection Agency, Environmental Protection Technology Series, Report EPA 600/2-76-127, July, 1976. 53 p. 10 fig, 17 tab, 12 ref.

Descriptors: *Water pollution effects, *Crustaceans, *Oil spill, *Intertidal areas, Littoral, *Temperature, *California, *Marine animals, Benthic fauna, Benthic flora, Mollusks, Laboratory investigation, *On-site observations.
Identifiers: Southern California. *Santa Barbara, *Santa Barbara Crude oil, *Barnacles, *Chthamalus fissus, *Barnacle larvae, *Black body effect.

Experiments were conducted in the field and laboratory in Southern California to determine the effects of heavy black asphaltic Santa Barbara crude oil on the intertidal barnacle Chthamalus fissus. Observations were also made on surfaces in the Santa Barbara Channel oiled following the 1969 Santa Barbara oil spill. The data presented support the original hypothesis that this type of oil acts as a black body. It is this 'black body' effect which has a long term influence on Chthamalus fissus distribution after the oil has developed a hard surface crust. This is based on the following observations: (1) larvae can settle, survive, and grow on the dry oil (tar) (2) larvae prefer a black surface to a light surface (3) temperature stresses are greater on a black surface than on a light surface (Katz)
W77-03004

BIOTRANSFORMATION AND CHEMICAL FORM OF MERCURY IN PLANTS,
Environmental Montoring and Support Lab., Las Vegas, Nev.
D. D. Gay
Ecological Research Series, Report EPA-600/3-76-082, July 1976, 9 p, 3 fig, 29 ref.

Descriptors: *Mercury, *Plant physiology, *Plant tissues, *Metals, *Water pollution effects, Biochemistry, Absorption, *Environmental effects, Trace elements, *Legumes, *Public health, Enzymes.
Identifiers: *Plant biochemistry, *Methylmercury, *Mercurial transformation, Biotransformation, *Phenylmercury, *Pisum sativum, Peas.

The in vitro methylation of inorganic mercury has been demonstrated using an acetone precipitated protein fraction from Pisum sativum and S-adenosylmethionine as the methyl-donating compound. A time course of the enzymatic formation of methylmercury has shown that the maximum methylmercury concentration occurred after 1 hour of incubation of the substrates with the enzyme system. At all subsequent incubation times reduced concentrations of methylmercury in the reaction mixture were observed. When a time course for the in vivo methylation of inorganic mercury was done using an infiltration and incubation procedure, the maximum concentration of methylmercury was observed after 10 hours of incubation. All subsequent incubation periods produced lesser amounts of methylmercury. The results suggest that the methylmercury is an intermediate compound in the mercury pathway in peas (Pisum sativum). (Katz)
W77-03006

IMPACTS OF CONSTRUCTION ACTIVITIES IN WETLANDS OF THE UNITED STATES,
Tereco Corp., College Station, Tex.
R. M. Darnell, W. E. Pequegnat, B. M. James, F. J. Benson, and R. A. Defenbaugh.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-256 674. Price codes: A19 in paper copy, A01 in microfiche. Environmental Protection Agency, Ecological Research Series, Report EPA 600/3-76-045, April 1976. 392 p, 7 tab, 6 fig, 1023 ref.

Descriptors: *Wetlands, *Marshes, *Freshwater marshes, *Coastal marshes, *Tidal marshes, *Swamps, Aquatic environment, *Aquatic habitats, *Land reclamation, Soils, *Soil-water-plant relationships, *Wildlife, Aquatic plants, Aquatic animals, Streams, Estuaries, Continental shelf, Bibliographies, Reviews, Water quality, *Construction.

The primary types of construction activity which severely impact wetland environments of the United States include: floodplain surfacing and drainage, mining, impoundment, canalization, dredging and channelization, and bank and shoreline construction. Each type of construction activity is attended by an identifiable suite of physical and chemical alterations of the wetland environment which may extend for many miles from the site of construction and may persist for many years. In turn, each type of physical and chemical modification has been shown to induce a derived set of biological effects, many of which are predictable, in general, if not in specific detail. The most environmentally damaging effects of construction activities in wetland areas, in order of importance, are: direct habitat loss, addition of suspended solids and modification of water levels and flow regimes. Major construction-related im-

acts also derive from altered water temperature, pH, nutrient levels, oxygen, carbon dioxide, hydrogen sulfide, and certain pollutants such as heavy metals, radioactive isotopes, and pesticides. (Katz)
W77-03007

CADMIUM IN AN AQUATIC ECOSYSTEM: DISTRIBUTION AND EFFECTS,
New York Univ. Medical Center, N. Y. Inst. of Environmental Medicine.
For primary bibliographic entry see Field 5B.
W77-03009

THE BIOLOGY AND CHEMISTRY OF A WARM-WATER STREAM,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
M. L. Brehmer, R. C. Ball, and N. R. Kevern.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-242 112, Price codes: A04 in paper copy, A01 in microfiche. Institute of Water Research, Michigan State University, Technical Report No. MSU-IWR-TR-8-003, Red Cedar River Series, December 1968. 0 p, 8 tab, 3 fig, 23 ref.

Descriptors: *Michigan, *Water pollution sources, Streams, *Urban drainage, Drainage area, Surface waters, Sediments, *Sewage, Sewage disposal, Urbanization, Erosion, *Ammonia, Ammonium compounds, Aquatic animals, Aquatic insects, *Benthic fauna, *Dissolved oxygen, Water pollution effects, Nutrients.
Identifiers: *Red Cedar River(Mich), Lansing(Mich).

The Red Cedar River, once a productive smallmouth bass stream, is located within the recreational area of metropolitan Lansing. The aesthetic and recreational value of this stream has been reduced as the result of urbanization and increased agricultural use, with the resulting fast runoff, erosion, and siltation, and by the introduction of domestic and industrial pollution. This study is concerned with the effects of nutrient inputs on the ecology of the stream and presents data vital to the reclamation processes. Specific emphasis is given to the ammonia nitrogen content and the dissolved oxygen content of the water, and the families of benthic forms present in the stream. Early observations seem to indicate that stream fertilization resulting from nutrient input released by the decomposition and mineralization of the organic material in the domestic sewage increased the complexity of the standing crop of the area. (Katz)
W77-03010

THE DISTRIBUTION AND ABUNDANCE OF LARVAL FISHES ALONG THE WESTERN SHORE OF LAKE ERIE AT MONROE, MICHIGAN,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 2H.
W77-03011

RESULTS FROM AQUATIC ECOLOGICAL SURVEYS AT NEWPORT ARMY AMMUNITION PLANT, NEWPORT, INDIANA,
Edgewood Arsenal, Aberdeen Proving Ground, Md.
J. S. Bender, and J. G. Pearson.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-016 977, Price codes: A03 in paper copy, A01 in microfiche. Technical Report, EB-TR-75044, October, 1975. 39 p, 12 tab, 4 fig, 17 ref.

Descriptors: *Methodology, *Benthos, *Water quality, *Invertebrates, Aquatic animals, Aquatic environment, Industrial wastes, Streams, Productivity, Degradation(Stream), Flow rates, Water pollution treatment, *Water pollution effects, Natural streams, Sewage sludge, Water pollution sources, On-site-investigations, *Indiana.
Identifiers: Monitoring, *Aquatic ecological survey, Wabash River(Ind), Munitions manufacturing, *Munitions wastes, *Trinitrotoluene(TNT).

Aquatic ecological surveys were conducted at Newport Army Ammunition Plant (NAAP) from February through June 1973 to determine the effects of TNT manufacturing and other plant operations on the water quality and stream biota of the drainages surrounding NAAP. Macroinvertebrates and stream water quality were sampled monthly, and fishes quarterly. Fishes collected were typical for streams in the area. Diversity and abundance of macroinvertebrates were affected more by natural fluctuations in the flow and runoff than by discharges or accidental spill from the TNT facility. Little Vermillion Creek received TNT wastes several times during the study, from accidental spills; however, no effect on species diversity or occurrence was detected. Little Raccoon Creek was biologically degraded by remnant sewage sludges and boiler blowdown; however, it had significantly recovered before it left the plant area. The discharge from the TNT plant entered the Wabash River after combining with the domestic sewage discharge. It was distinquishable from the river water by its color and high sulfate and conductivity values. There was insufficient biological data from the Wabash River to determine any effects from the TNT discharge. (Katz)
W77-03015

TOXAPHENE EFFECTS ON REPRODUCTION, GROWTH, AND MORTALITY OF BROOK TROUT,
Fish and Wildlife Service, Columbia, Mo. Fish-Pesticide Research Lab.
F. L. Mayer, Jr., P. M. Mehrle, Jr., and W. P. Dwyer.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-249 303, Price codes: A04 in paper copy, A01 in microfiche. Environmental Protection Agency, Ecologic Research Series, Report EPA 600/3-75-013, November 1975. 42 p., 15 tab., 2 fig., 69 ref.

Descriptors: *Brook trout, *Toxicity, Laboratory analysis, *Insecticide, *Chlorinated hydrocarbon pesticides, Pesticides, *Water pollution effects, Water pollution sources, *Growth rate, Environmental effects, *Mortality, *Bioassay, *Laboratory animals, Pathology, Fish fry, *Salmonids, *Reproduction.
Identifiers: *Toxaphene, *Continuous flow bioassay, Flow-through dilution system, *Collagens, *Chronic effects, Residue dynamics.

Yearling brook trout (Salvelinus fontinalis) were continuously exposed to toxaphene (0, 39, 68, 139, 288 and 502 ng/l) in a flow-through diluter system. Day length and water temperature were altered monthly to correspond to natural conditions. Adult growth was reduced in the 288 and 502 ng/l toxaphene exposures, and the added stress of spawning activities caused extensive mortalities in these concentrations. The numbers of eggs spawned and percent viability were inversely related to increasing toxaphene concentrations. All groups of fry exposed to toxaphene had reduced rates of growth and survival. Biochemical investigations on fry backbones demonstrated that bone collagen may be a sensitive indicator of normal and abnormal growth and development prior to being observed in the whole fish. Toxaphene was accumulated by brook trout 5,000 to 76,000 times that in the water and the more chlorinated isomers of toxaphene were preferentially stored. (Katz)
W77-03017

METHYL MERCURY AND THE METABOLIC RESPONSES OF BRAIN TISSUE,
Health Effects Research Lab., Cincinnati, Ohio.
R. J. Bull.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-252 006, Price codes: A03 in paper copy, A01 in microfiche. Environmental Health Effects Research Series, Report EPA 600/1-76-013, March 1976, 23 p., 7 fig., 30 ref.

Descriptors: *Mercury, *Public health, *Water pollution effects, Biochemistry(Animal), *Animal pathology, *Animal physiology, *Toxicity, Growth rates, *Metabolism, Potable water, Laboratory observations.
Identifiers: *Mercury organic compounds, *Methyl mercury, Cerebral cortex, *Brain energy metabolism.

Weanling, Sprague-Dawley rats have been exposed to methyl mercuric chloride (concentrations from 0.01 to 10.0 mg/liter) in their drinking water. At 10 mg/liter the animals exhibited neurological symptoms typical of methyl mercury. Also, in this group a considerable decrease in growth occurred which was associated with a decreased consumption of food. Responses of the respiratory intermediates to stimulation were found to be altered in cerebral cortex slices taken from exposed animals. Effects on tissue pyridine nucleotides predominated. An enhancement of the rats of pyridine nucleotide reduction by electrical stimulation was observed at 0.1 mg/liter. This rate progressively decreased at higher dose levels. Reoxidation of reduced pyridine nucleotide was also inhibited at 0.1 mg/liter at both 90 and 180 days of exposure. Potassium stimulated aerobic glycolysis was found to be enhanced in its initial stages at 0.10 mg/liter of methyl mercuric chloride in the drinking water but progressively declined at 1.0 and 10 mg/liter. A close parallel was observed between the time constant of pyridine nucleotide oxidation following electrical stimulation and the 'responsiveness' of the aerobic glycolytic rate to stimulation by potassium. These results suggest an initial defect in the oxidation of cytoplasmic NADH which progresses to loss of metabolic control of cytoplasmic oxidations. (Katz)
W77-03018

RESPONSE OF TWO ARCTIC AMPHIPODS, GAMMARUS ZADDACHI AND BOECKOSIMUS (ONISIMUS) AFFINIS TO VARIATIONS IN TEMPERATURE AND SALINITY,
Louisville Univ., Ky. Dept. of Biology.
M. Busdosh, and R. M. Atlas.
Journal of the Fisheries Research Board of Canada, Vol. 32, p. 2564-2568, 1975, 3 tab., 2 fig., 15 ref.

Descriptors: *Temperature, *Salinity, *Amphipoda, *Arctic, *Resistance, *Respiration, *Animal physiology, *Environmental effects, *Mortality, Laboratory tests, Crustaceans, Invertebrates, Cold regions.
Identifiers: *Gammarus zaddachi, *Boeckosimus(Onisimus) affinis.

Two arctic amphipod were found to be capable of tolerating a wide range of temperatures and salinities. They were tolerant to both abrupt changes, as would occur in crossing a thermocline, and to gradual changes, as would occur seasonally. Gammarus zaddachi could survive lower salinities and higher temperatures than Boeckosimus (Onisimus) affinis. Salinity had a statistically significant effect on rates of respiration rate in response to temperature changes. The ecological distribution of these amphipods appears to be in part determined by their ability to tolerate fluctuations in salinity and temperature. (Katz)
W77-03019

PRODUCTION BY BROOK TROUT (SALVELINUS FONTINALIS) IN FOUR STREAMS IN THE MATAMEK WATERSHED, QUEBEC,
Waterloo Univ. (Ontario). Dept. of Biology.
J. F. O'Connor, and G. Power.

Journal of the Fisheries Research Board of Canada, Vol. 33, No. 1, p. 6-18, January, 1976. 2 fig., 10 tab., 24 ref.

Descriptors: *Limiting factors, *Fish populations, *Food webs, *Productivity, *Brook trout, *Environmental effects, *Trout, *Stream fisheries, *Benthos, *Aquatic habitats, Salmonids, Biomass, Growth rates, Population, Streams, Biological communities, Fish diets, *Canada.
Identifiers: *Canadian shield, *Matamek River(Quebec).

Production by brook trout (Salvelinus fontinalis) in four infertile streams on the Canadian Precambrian Shield was estimated to be between 14.5 and 66.4 kg/ha per yr during 3 successive yr of study (1971-73). These values represent the range of total fish flesh elaborated annually in these streams because trout was the only species present. Differences between streams in annual production and P:B ratios arose from variations in stream cover (and its effect on carrying capacity), recruitment, and total biomass. Variations in age-specific growth rates were not critical. Production in the two most productive streams was judged to be controlled by food, while in the other two streams lack of suitable cover for adult trout limited production. (Katz)
W77-03020

ZINC UPTAKE BY ATLANTIC SALMON (SALMO SALAR) EXPOSED TO A LETHAL CONCENTRATION OF ZINC AT 3, 11 AND 19 C,
Guelph Univ. (Ontario). Dept. of Zoology.
P. V. Hodson.
Journal of the Fisheries Research Board of Canada, Vol. 32, p. 2552-2556, 1975, 1 tab., 1 fig., 24 ref.

Descriptors: *Zinc, *Tracers, *Absorption, *Radioisotopes, *Temperature, *Salmon, *Zinc radioisotopes, *Atlantic salmon, *Bioassay, *Toxicants, Laboratory tests, Analytical techniques, Metals, Inhibition, Mode of action.
Identifiers: *Bioaccumulation, Gills.

Atlantic salmon (Salmo salar) acclimated to 3, 11 and 19 C took up high concentrations of zinc in gill tissues during exposures to a nominal 14 mg/liter of zinc The rate of zinc uptake, as shown by isotopic zinc tracer, increased from a minimum of 3 C to a maximum of 19 C. In fish killed by zinc exposure, zinc concentrations in gills were highest at 19 C and lowest at 3 and 11 C. (Katz)
W77-03021

PURGING A MUDDY-EARTHY FLAVOR TAINT FROM RAINBOW TROUT (SALMO GAIRDNERI) BY TRANSFERRING TO ARTIFICIAL AND NATURAL HOLDING ENVIRONMENTS,
Fisheries and Marine Service, Winnipeg (Manitoba). Freshwater Inst.
For primary bibliographic entry see Field 5G.
W77-03023

TEMPERATURE TOLERANCE OF YOUNG-OF-THE-YEAR LAKE WHITEFISH, COREGONUS CLUPEAFORMIS,
National Marine Fisheries Service, Ann Arbor, Mich. Great Lakes Fishery Lab.
T. A. Edsall, and D. V. Rottiers.
Journal of the Fisheries Research Board of Canada, Vol. 33, p. 177-180, 1976, 3 tab., 2 fig., 11 ref.

Descriptors: *Temperature, *Lethal limit, *Cisco, *Freshwater fish, *Environmental effects, *Heated water, Powerplants, Mortality, Resistance, Great Lakes, Water pollution sources, Size, Laboratory tests, Analytical techniques, *Thermal pollution.
Identifiers: *Coregonus spp., *Lake Whitefish, Temperature tolerance.

Laboratory tests indicated that the ultimate upper lethal temperature of young-of-the-year lake whitefish, Coregonus clupeaformis, an important food fish in the upper Great Lakes, was 26.65C. This value is similar to that reported for yearling bloaters, C. hoyi, at 26.75C and for young-of-the-year lake herring, C. artedii, at 26.0C. (Katz)
W77-03024

UPPER LETHAL AND PREFERRED TEMPERATURES OF THE SLIMY SCULPIN, COTTUS COGNATUS,
Fisheries and Marine Service, St. Andrews (New Brunswick). Biological Station.
P. E. K. Symons, J. L. Metcalfe, and G. D. Harding.
Journal of the Fisheries Research Board of Canada, Vol. 33, p. 180-183, 1976, 1 tab., 1 fig., 16 ref.

Descriptors: *Temperature, *Lethal limit, *Heated water, *Sculpins, *Environmental effects, *Clear-cutting, Mortality, Laboratory tests, Distribution, Methodology, Watershed management, Water pollution effects, *Thermal pollution.
Identifiers: *Cottus cognatus, Upper lethal temperatures, Preferred temperature.

Laboratory experiments showed the upper lethal and preferred (96-h LT60) temperatures of slimy sculpin (Cottus cognatus) acclimated at 20C were 25.0 and 13C, respectively. (Katz)
W77-03025

PHYSIOLOGICAL RESPONSES OF RAINBOW TROUT (SALMO GAIRDNERI) TO ELECTROSHOCK,
Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.
C. B. Schreck, R. A. Whaley, O. E. Maughan, and M. Solazzi.
Journal of the Fisheries Research Board of Canada, Vol. 33, p. 76-84, 1976, 2 tab, 4 fig, 45 ref.

Descriptors: *Biochemistry, *Enzymes, *Mortality, *Fish physiology, *Rainbow trout, *Bioassay, *Electro-fishing, Analytical techniques, *Respiration, *Stress, *Metabolism, Oxygen sag, Environmental effects, Fishing, Sampling, Laboratory tests.
Identifiers: *Electrocardiogram, *Electroshocking.

Electroshocking caused an immediate increase in plasma corticoid and lactate concentrations and thrombocyte; leucocyte ratio in rainbow trout (Salmo gairdneri). Plasma glucose concentrations increased after 3 hours while protein, calcium, magnesium, and androgen levels were unaffected. Plasma lactate returned to preshock levels within 3 h, but corticoid and glucose concentrations were elevated for at least 6 h. Normal breathing was disrupted for 60 s post shocking. Breathing frequency did not increase, but buccal pressure increased substantially and returned to normal within 1 h. Cardiac activity was irregular immediately after shocking. The height of the T wave in EGGs increased 1-3 min after shocking. Responses exhibited are most likely attributable to combined effects of trauma, factors associated with paying off an oxygen debt and attributes associated with the general adaptation syndrome of stress. (Katz)
W77-03026

MOVEMENT OF YELLOW PERCH (PERCA FLAVESCENS) AND WHITE SUCKER (CATOSTOMUS COMMERSONI) IN A NEARSHORE GREAT LAKES HABITAT SUBJECT TO A THERMAL DISCHARGE,
Canada Centre for Inland Waters, Burlington (Ontario).
J. R. M. Kelso.
Journal of the Fisheries Research Board of Canada, Vol. 33, p. 42-53, 1976, 3 tab, 6 fig, 8 ref.

Descriptors: *Effluents, *Great Lakes, *Yellow perch, *Suckers, *Movement, *Distribution, *Fish behavior, *Heated water, *Water temperature, Water pollution sources, Thermal water, Temperature, Water pollution effects, Methodology, On-site data collection, *Thermal pollution.
Identifiers: *Catostomus commersoni.

The thermal discharge from the Nanticoke Generating Station caused both yellow perch (Perca flavescens) and white sucker (Catostomus commersoni) to increase sharpness of turns, decrease distance between turns, and to orient into the current generated by the discharge. Conversely, fish released in thermally unaffected habitat referenced movement to the shoreline, turned less sharply, and swam greater distances between turns. The tendency for localization of movement was increased for both species when in the influence of the discharge; however, these fish had to contend with currents generated by the effluent thus making comparisons anomalous. Exposure of fish to elevated temperatures was brief and ranged from a few excursions into thermally elevated areas to approximately 9 h. Fish transplanted from unaffected areas to the discharge areas showed behavior similar to fish caught and released at the discharge site. Two fish tracked when cooling was discharged at ambient temperature suggested that current had a role in causing the observed change in behavior. (Katz)
W77-03027

NEUROMUSCULAR FUNCTION AND ACETYLCHOLIN-ESTERASE IN THE PECTORAL ABDUCTOR MUSCLE OF LARGEMOUTH BASS (MICROPTERUS SALMOIDES) AS EVIDENCED BY THE EFFECTS OF DIISOPROPYLFLUOROPHOSPHATE,
Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.
P. W. Schneider,Jr, and L. J. Weber.
Journal of the Fisheries Research Board of Canada, Vol. 32, p. 2153-2161, 1975, 1 tab, 4 fig, 2 ref.

Descriptors: *Organophosphorous compounds, *Biochemistry, *Fish physiology, *Enzymes, *Inhibitors, *Analytical techniques, *Bass, *Mode of action, Laboratory tests, Metabolism.
Identifiers: *Acetylcholinesterase, *Neuromuscular activity, *Diisopropylfluorophosphate, *DFP, Muscle function.

The significance of acetylcholinesterase (AChE) to neuromuscular transmission in the pectoral fin abductor muscle of largemouth bass (Micropterus salmoides) was evaluated by establishing in vivo first, the occurrence of enzyme inhibition by diisopropylfluorophosphate (DFP) and, second, the correlation between muscular response to it, direct stimulation and enzyme inhibition. Dose-response curves for inhibition of AChE by DFP indicated that DFP had access to and did inhibit AChE. Modification of the muscular response was observed and severity appeared to be positively correlated to AChE inhibition. The modification, however, was not typical of cholinergic systems in that the ability to produce and maintain a tetanus was never abolished even with inhibition in excess of 99% of control levels. It was concluded that AChE is not as important for neuromuscular transmission in largemouth bass as has been established for other vertebrates, and that the acute toxic effects of DFP to largemouth bass are not mediated by a collapse of neuroskeletal muscle function. (Katz)
W77-03028

VIABLE EMBRYOGENESIS OF THE WINTER FLOUNDER PSEUDOPLEURONECTES AMERICANUS FROM -1.8 DEG TO 15 DEG C,
State University of New York at Stony Brook. Dept. of Ecology and Evolution.
G. C. Williams.

rine Biology, Vol. 33, No. 1, p. 71-74, 1975, 1 , 2 fig, 13 ref.

scriptors: *Fish physiology, *Embryonic wth stage, *Mortality, *Fish eggs, *Fish roduction, *Temperature, *Freezing, atching, *Lethal limit, *Water temperature, oratory tests, Environmental effects, Fishkill, w York.
ntifiers: *Flounders, Pseudopleuronectes ericanus.

udopleuronectes americanus spawns in late ter near New York, and its eggs may be found hallow water under ice at temperatures below usual freezing point of vertebrate tissues. Sur- l and duration of development at a variety of stant temperatures were recorded for artifi- ly fertilized eggs in the laboratory. Many eggs ched into normal larvae after 2 months at the est temperature tried, -1.8C. The upper lethal perature was about 15C. There was a linear tion between log time and temperature in the imum mortality range (0 to 10C), with a Q10 of ut 4.8. (Katz)
7-03029

BLETHAL EFFECT OF 5-CHLOROURACIL CARP (CYPRINUS CARPIO) LARVAE,
Ridge National Lab. Oak Ridge, Tenn.
). Eyman, C. W. Gehrs, and J. J. Beauchamp.
rnal of the Fisheries Research Board of ada, Vol. 32, p. 2227-2229, 1975. 1 fig., 9 ref.

criptors: *Toxicants, *Carp, *Larval growth e, *Larvae, *Water pollution effects, thology, *Fish diseases, *Mortality, *Fish , *Bioassay, *Chlorine, Reproduction, oratory tests, Fish reproduction, Growth es, Statistical methods.
ntifiers: *Sublethal effects, *5-Chlorouracil.

sublethal effects of 5-clorouracil, expressed gross anatomical malformations, on newly ched carp (Cyprinus carpio) larvae are ented. The percent malformed of those ched was 1.2 at 0.5 ppm, 2.1 at 1.0 ppm, 2.7 at ppm, and 4.3 at 10 ppm. Both a least-squares fit hyperbolic model and a linear-regression fit used to describe the response. The malforma- s are an incremental effect of exposure to a cant which should be considered in addition to mortality in assessing the effect of environ- tal toxicants on populations. (Katz)
7-03031

REASED OPERCULAR RATES OF PINK MON (ONCORHYNCHUS GORBUSCHA) AFTER EXPOSURE TO THE WATER- UBLE FRACTION OF PRUDHOE BAY DE OIL,
fornia State Univ., Chico. Dept. of Biological nces.
. Thomas, and S. D. Rice.
nal of the Fisheries Research Board of ada, Vol. 32, p. 2221-2224, 1975. 1 tab., 10 ref.

criptors: *Fish physiology, *Fish behavior, vironmental effects, *Stress, *Water pollution cts, *Oil, *Pink salmon, *Fry, *Toxicants, tabolism, Salmon, Laboratory tests, Water ution sources, Analytical techniques, Juvenile Organic compounds.
tifiers: *Opercular rates, *Sublethal effects.

opercular rates of pink salmon corhynchus gorbuscha) fry were measured ng 24-h exposure to sublethal concentrations he water-soluble fraction of Prudhoe Bay e oil. Opercular rates increased significantly s long as 9 and 12 h after exposure to water- ble fractions prepared from oil-water solutions 83 and 3.46 ppm. The increases in rates ap- s to be a suitable method for detecting ethal physiological effects of stress, because bserved changes occurred at approximately of the 96 h-LC50. (Katz)

W77-03032

CHLORINATED HYDROCARBONS IN CETACEANS,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
For primary bibliographic entry see Field 5A.
W77-03033

DIELDRIN IN THE DIET OF CHANNEL CATFISH (ICTALURUS PUNCTATUS): UPTAKE AND EFFECT ON GROWTH,
National Marine Fisheries Service, Ann Arbor, Mich. Great Lakes Fishery Lab.
R. L. Argyle, G. C. Williams, and C. B. Daniel.
Journal of the Fisheries Research Board of Canada, Vol. 32, p. 2197-2204, 1975. 5 fig, 4 tab, 12 ref.

Descriptors: *Pesticide residues, *Growth rates, *Channel catfish, *Dieldrin, *Absorption, *Path of pollutants, *Fish diets, *Digestion, Laboratory tests, Analytical techniques, *Chlorinated hydrocarbon pesticides, Insecticides, Pesticides, Pollutant identification.
Identifiers: *Tissue analysis.

Fingerling channel catfish (Ictalurus punctatus) were given diets containing 0.4, 0.8, or 4.0 micrograms dieldrin/g of food for 210 days, followed by a dieldrin free diet for 56 days. Catfish receiving 4.0 micrograms dieldrin/g food gained about 17 percent less weight than the control fish in 210 days and about 35 percent less weight during the last 126 days of the 210-day period. No growth differences were apparent in the other test groups. Dieldrin accumulations were characterized by an immediate rapid rise in residual levels in the tissues, followed by a period during which concentrations were relatively stable. Residues in tissues decreased rapidly after dieldrin was withdrawn from the diet. Mean dieldrin half-life was 9.6 days. (Katz)
W77-03034

EXCRETION OF AMMONIA AND INORGANIC PHOSPHOROUS BY EUPHAUSIA PACIFICA AND METRIDIA PACIFICA AT DIFFERENT CONCENTRATIONS OF PHYTOPLANKTON,
British Columbia Univ., Vancouver. Inst. of Oceanography.
M. Takahashi, and T. Ikeda.
Journal of the Fisheries Research Board of Canada, Vol. 32, p. 2189-2195, 1975, 6 fig, 23 ref.

Descriptors: *Zooplankton, *Metabolism, *Nutrients, *Ammonia, *Phosphorous, *Organic wastes, *Phytoplankton, *Cycling nutrients, *Nutrient removal, Populations, Laboratory tests, Kinetics.
Identifiers: *Euphausia pacifica, *Metridia pacifica, Excretion.

Roles of excretion in the forms of ammonia and inorganic phosphorous were determined for Euphausia pacifica and Metridia pacifica at different phytoplankton concentrations. Nutrient uptake rate of the phytoplankton sample was determined using Michaelis-Menten kinetics. The gross excretion of nutrients by zooplankton was estimated by summing the apparent excretion and nutrient removed by phytoplankton. Two significant effects of phytoplankton on zooplankton excretion were recognized: rapid removal from the medium of nutrients excreted by zooplankton and increase in nutrient excretion by zooplankton. The increase in nutrient excretion by zooplankton due to adding phytoplankton was proportional to the amount of phytoplankton ingested. Compared with the excretion rate at zero phytoplankton density, the excretion rate increased 5 times at 15 micrograms chlorophyll a/liter for M. pacifica and 9 times at 70 micrograms chlorophyll a/liter for E. pacifica. (Katz)
W77-03036

QUANTITATIVE RELATIONS BETWEEN THE BRYOPHYTES OF THE BELGIAN PART OF THE RIVER SAMBRE AND THEIR FREQUENCY OF EMERSION: VERTICAL DISTRIBUTION AND INFLUENCE OF POLLUTION, (IN FRENCH),
Liege Univ. (Belgium). Dept. of Botany.
For primary bibliographic entry see Field 5B.
W77-03038

A LAKEWIDE STUDY OF PHYTOPLANKTON BIOMASS AND ITS SPECIES COMPOSITION IN LAKE ERIE, APRIL-DECEMBER 1970,
Canada Centre for Inland Waters, Burlington (Ontario).
M. Munawar, and I. F. Munawar.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 3, p. 581-600, March, 1976, 12 fig, 8 tab, 47 ref.

Descriptors: *Eutrophication, *Biomass, *Lake Erie, *Sampling, *Phytoplankton, *Diatoms, *Nannoplankton, Seasonal, Population, *Biological communities, Distribution, *Spatial distribution, *Primary productivity, Aquatic microorganisms, On-site data collections, Food chains.
Identifiers: *Species composition.

Surface samples of phytoplankton were collected from April to December 1970 from 25 stations distributed over Lake Erie. About 125-150 species were identified in each basin. Certain species were identified as common to all three basins, while some phytoplankton species typified each basin. Diatoms contributed least in the Eastern basin (36%) but showed high percentage in both Central (55%) and Western (58%) basins. Phytoflagellates increased from the west to east basins and appeared to be adaptable to different nutrient conditions. During July and August high biomass concentrations but uneven horizontal distribution was observed. Phytoplankton biomass ranged between 0.8 and 13. 2, 0.6 and 6.0 and 1.0 and 4.2 g/cubic meter in the Wester, Central, and Eastern basins, respectively. Inshore-offshore differentiation was observed in the Central and Eastern Basins with many peaks in the inshore region. Bsed on maximum biomass concentration the Lake Erie Western basin was classified as highly eutrophic, the Eastern basin as mesotrophic and the Central basin between the mesotrophic and eutrophic conditions. (Katz)
W77-03039

BEHAVIOR OF HYDRAZINE COMPOUNDS IN HARD AND SOFT WATER,
Air Force Systems Command, Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 5B.
W77-03042

THE EMERGENCE OF INSECTS FROM A BRITISH RIVER WARMED BY POWER STATION COOLING-WATER. PART I. THE USE AND PERFORMANCE OF INSECT EMERGENCE TRAPS IN A LARGE, SPATE-RIVER AND THE EFFECTS OF VARIOUS FACTORS ON TOTAL CATCHES, UPSTREAM AND DOWNSTREAM OF THE COOLING-WATER OUTFALLS,
Central Electricity Generating Board, Ratcliffe-on-Soar (England). Freshwater Biology Unit.
T. E. Langford, and J. R. Daffern.
Hydrobiologia, Vol 46, No 1, p 71-114, 22 fig, 7 tab, 21 ref, 2 append.

Descriptors: *Environmental effects, *Water pollution effects, *Heated water, Temperature, Insects, Growth stages, Powerplants, River flow, *Thermal pollution, *Aquatic insects, Cooling water.
Identifiers: *Emergence patterns(Insects), *River Severn(UK).

The study was conducted upstream and downstream of Ironbridge A and B power stations on the River Severn. Traps used in catching adult emerging insects are described and their overall performance, total catches and species selectivity is related to the physical characteristics of the river. Some relationship was observed between emergence rates, river flow and temperatures but the data suggested that the most significant factor was river flow. Temperature increases did not appear to have a significant effect on the total numbers overall emergence period of Trichoptera, Ephemerptera and Megaloptera. (See also W77-03044) (Chilton-ORNL)
W77-03043

THE EMERGENCE OF INSECTS FROM A BRITISH RIVER, WARMED BY POWER STATION COOLING-WATER. PART II. THE EMERGENCE PATTERNS OF SOME SPECIES OF EPHEMEROPTERA, TRICHOPTERA, AND MEGALOPTERA IN RELATION TO WATER TEMPERATURE AND RIVER FLOW, UPSTREAM AND DOWNSTREAM OF THE COOLING-WATER OUTFALLS,
Central Electricity Generating Board, Ratcliffe-on-Soar (England). Freshwater Biology Unit.
T. E. Langford.
Hydrobiologia, Vol 47, No 1, 1975, p 91-133, 11 tab, 11 fig, 46 ref.

Descriptors: *Environmental effects, *Heated water, Water pollution effects, Temperature, Insects, Growth stages, Powerplants, *Thermal pollution, *Aquatic insects, *Mayflies, Water temperature, Cooling water.
Identifiers: *Emergence patterns(Insects), *River Severn(UK), *Megaloptera, *Trichoptera.

No evidence of early emergence patterns downstream from the power station were observed. Temperature increases reached 8C, maximum water temperatures reached 28C, total degree-hours increased to 24% more during the spring, and there was a four-week advance in degree-hour accumulation. Emergence for most species was observed at 12C to 28C. High temperatures did appear to halt emergence or shorten the emergence period. (See also W77-03043) (Chilton-ORNL)
W77-03044

FIDELITY OF THERMOPHILIC BLUE-GREEN ALGAE TO HOT SPRING HABITATS,
Oregon Univ., Eugene Dept. of Biology.
J. E. Jackson, Jr., and R. W. Castenholz.
Limnology and Oceanography, Vol 20, No 3, May 1975, p 305-322, 6 fig, 5 tab, 17 ref. NSF GB-31945X.

Descriptors: *Environmental effects, *Thermal pollution, *Heated water, *Hot springs, Algae, *Cyanophyta, Aquatic plants, *Wyoming, National Parks.
Identifiers: *Thermophilic plants, Willamette Valley(Wyo), *Yellowstone National Park.

Samples from the Yellowstone Plateau and the Willamette Valley were incubated in photoautotrophic medium at 14, 35, and 45C. Blue-green algae developed at 35C in samples from numerous habitats. At 45C, the growth of blue-green algae was apparent in samples taken from sources downstream of heated waters but not in samples taken above heated discharges. These results indicate generally that the number of indentifiable hot spring blue-green algal species in rivers and the number of recoverable colonies are inversely related to the distance downstream from the points of hot spring discharge. Thermophilic blue-green algae having a growth temperature optimum of over 45C have a high fidelity to heated water habitats in temperate or colder climates but some species may be established elsewhere in warmer areas. (Chilton-ORNL)
W77-03045

THE EFFECT OF THE DISCHARGE OF THERMAL EFFLUENT FROM A POWER STATION ON THE PRIMARY PRODUCTIVITY OF AN EPIPHYTIC ALGAL COMMUNITY,
Alberta Univ., Edmonton. Dept. of Botany.
M. Hickman, and D. M. Klarer.
Br. phycol. J., Vol 10, March 1975, p 81-91, 2 fig, 2 tab, 41 ref.

Descriptors: *Environmental effects, *Water pollution effects, *Thermal pollution, Heated water, Powerplants, Algae, Temperature, Biological communities, Standing crops, *Primary productivity, *Canada, Lakes.
Identifiers: *Epiphytic algae, *Lake Wabamun(Alberta).

Thermal discharges were shown to cause an increase in the standing crop size of the epiphyton associated with Scripus validus and the mean primary productivity increased as a result. Thermal discharges were also found to cause changes in species composition and dominance in algal communities. The most noticeable difference between heated and non-heated areas was the occurrence as dominants of Oedogonium and Spirogyra during the spring and late summer at the heated site. The heated water approximately doubled the photosynthetic index of the non-heated site samples suggesting that the algal populations in the non-heated area were not photosynthesising at optimum temperatures. Continuous flow of heated water appeared to cause a decrease in photosynthetic efficiency in the heated area. (Chilton-ORNL)
W77-03046

HETEROMORPHIC DEVELOPMENT OF AEDINE MOSQUITOES REARED AT ABNORMAL TEMPERATURES,
Illinois Univ. at Urbana-Champaign. Dept. of Entomology.
W. R. Horsfall.
Annals of Zoology, Vol 11, 1974, p 224-236, 15 fig, 28 ref.

Descriptors: *Environmental effects, *Temperature, *Mosquitoes, Sexual maturity, Laboratory tests, Reproduction, Gonads, Aquatic insects.
Identifiers: *Heteromorphic development(Insects).

Morphic variations in the adult stage of several species of mosquitoes were induced by different constant temperatures in the laboratory. The report includes descriptions of the modifications exhibited by the normally male-producing component when reared at constant temperatures of 21-28C. High temperature was found to inhibit the expression of the male features but not those of the female. Resulting adults are heteromorphic in degree of maleness according to the temperature. (Chilton-ORNL)
W77-03047

RELATION OF WATER TEMPERATURE TO FLEXIBACTER COLUMNARIS INFECTION IN STEELHEAD TROUT (SALMO GAIRDNERI) COHO (ONCORHYNCHUS KISUTCH) AND CHINOOK (O. TSHAWYTSCHA) SALMON,
Oregon State Univ., Corvallis. Dept. of Microbiology.
R. A. Holt, J. E. Sanders, J. L. Zinn, J. L. Fryer, and K. S. Pilcher.
Journal of the Fisheries Research Board of Canada, Vol 32, No 9, 1975, p 1553-1559, 1 fig, 3 tab, 7 ref. EPA No. R 800171.

Descriptors: *Environmental effects, *Pathogenic bacteria, Temperature, Salmonids, *Chinook salmon, Trout, Mortality, *Water temperature, *Rainbow trout.

Experimental fish were subjected to eight temperatures increasing from 3.9 to 23.9C by increments of 2.8C. The results indicated that the e
fects of water temperature on experimental infe
tion with F. columnaris were very similar in t
three species of salmonids studied. The lowe
temperature at which deaths were observed w
12.2C, while mortality increased progressive
with increasing temperature in the range of 12.2
20.5C. At 9.4C and below, conditions were u
favorable for progress of the infection. (Chilto
ORNL)
W77-03048

**TEMPERATURE-INDUCED CHANGES
ACUTE TOXICITY OF ZINC TO ATLANT
SALMON (SALMO SALAR),**
Guelph Univ., (Ontario). Dept. of Zoology.
P. V. Hodson, and J. B. Sprague.
Journal of the Fisheries Research Board
Canada, Vol 32, No 1, 1975, p 1-10, 3 fig, 3 tab,
ref.

Descriptors: *Environmental effects, *Water p
lution, Water pollution effects, *Toxicity, *Zi
*Atlantic salmon, Temperature, Mortality, Che
cal wastes.

Three groups of Atlantic salmon parr were ac
mated to water temperatures of 3, 11, and 19C a
were then exposed (at their acclimation tempe
tures) to lethal concentrations of zinc. The resu
showed that cold-acclimated salmon survi
longer than did warm-acclimated salmon but th
was less toxicity at the higher temperature. Te
perature-acclimated fish were about 50% m
tolerant of zinc at 19C than at 3C. Sudden te
perature changes altered thresholds even more
was concluded that, in polluted rivers, zinc c
centrations may be most damaging to fish popu
tions during the winter months. (Chilton-ORNL
W77-03049

**EFFECTS OF WATER TEMPERATURE A
HOUSING CONDITIONS UPON THE AGGR
SIVE BEHAVIOR OF THE LOBST
HOMARUS AMERICANUS,**
Dalhousie University, Halifax, Nova Sco
Canada, Department of Psychology.
R. S. Hoffman, P. J. Dunham, and P. V. Kelly.
Journal of the Fisheries Research Board
Canada, Vol 32, No 5, 1975, p 713-717, 2 fig,
ref.

Descriptors: *Environmental effects, Tempe
ture, *Animal behavior, Laboratory anim
Laboratory tests, *Lobsters, *Water temperatu
Water pollution effects, Fish behavoir.
Identifiers: *Aggressive behavior(Lobsters).

Data showed that experimental animals housed
5 and 10 degrees C showed more aggress
behavior at 10C than at 5C. The data demonstra
that individually housed lobsters were particul
more aggressive at higher temperatures than c
munally housed animals or those in physical is
tion with visual contact. (Chilton-ORNL)
W77-03050

**REGULATION OF OXYGEN CONSUMPTI
BY INCIDENT ILLUMINATION IN EM
RYONATED OVA OF ATLANTIC SALM
SALMO SALAR L.,**
Dalhousie Univ., Halifax, Nova Scotia. Dept
Biology.
T. Hamor, and E. T. Garside.
Comparative Biochemistry and Physiology,
52 A, 1975, p 277-280, 4 tab, 19 ref.

Descriptors: Environmental effects, *Li
*Respiration, *Atlantic salmon, Biochemical
ygen demand, *Embryonic growth stage, *W
pollution effects.

The possible effect of incident illumination
respiratory performance of Atlantic salmon
measured in 18 factorial combinations of 5 and

grees C, 30, 50 and 100% air-saturation and spirometer flowmrates of 0.4, 0.8, and 1.6 ml/min. xygen consumption was found to be generally eater at 10C than in comparable environments at '. Oxygen consumption increased in all all incution environments from 1-2001x and then creased rather abruptly near 250 lx. Three inractions, temperature and oxygen level, flow e and light, and temperature and oxygen and ht have significant effects. Other potential inractions did not reach the threshold for probable fect. (Chilton-ORNL)
77-03051

INTER FLOUNDER MOVEMENTS, ROWTH, AND MORTALITY OFF MAS-CHUSETTS,
assachusetts Dept. of Natural Resources, Sandch. Div. of Marine Fisheries.
B. Howe, and P. G. Coates.
ansactions of the American Fisheries Society, l. 104, No. 1, 1975, p 13-29, 13 fig, 2 tab, 26 ref.

scriptors: *Fish migration, *Growth rates, lortality, Fish, *Massachusetts, Tagging, Atlan- Ocean.
ntifiers: *Flounder, Pseudopleuronectes amernus, *Cape Cod(Mass), Fish movement.

h were tagged at locations selected on the basis known local concentrations during late March rough April in 1960-1965. Returns through 1971 re 36.5%. Movements north of Cape Cod were atively localized and confined to inshore waters t movements south of Cape Cod were asonally dispersed in a southeastward direction nerally beyond the territorial limit. There apared to be a relationship between water temrature and movements. Data showed that nales grew more rapidly than males south of pe Cod. Fish released in Vineyard and Nanket Sounds showed exploitation rates of 0.201, tural mortality rates of 0.273, and total mortality es of 0.474. (Chilton-ORNL)
77-03052

UNDANCE AND POPULATION DYNAMICS PARASITES INFECTING ATLANTIC SALON (SALMO SALAR) IN TROUT BROOK, W BRUNSWICK, CANADA,
heries and Marine Service, St. Andrews (New unswick). Biological Station.
M. Hare, and M. D. B. Burt.
rnal of the Fisheries Research Board of nada, Vol. 32, No. 11, 1975, p 2069-2074, 3 fig, 4 , 18 ref.

scriptors: Ecology, Population, *Parasitism, imal parasites, *Fish parasites, *Atlantic sal-n, *Canada, Seasonal, Age, Infection.
ntifiers: *Trout Brook(NB).

e parasite fauna of juvenile Atlantic salmon in out Brook was found to be composed of four mary species, the monogenean Discocotyle ittata (infecting 37.7% of the fish examined), digenean Crepidostomum farionis (40.5%), the matode Sterliadochona tenuissima (97.9%), and lochidium (32.0%). Six secondary species inted the juvenile salmon. Intensity of infection C. farionis and S. tenuissima was independent host age and sex. Males were found to be more vily infected with D. sagittata but this parasite s also independent of host age. No interactions re observed between season and host age nor ween season and host sex. D. sagittata was nd to be most abundant in summer and autumn, farionis and S. tenuissima in spring, and the chidium in autumn. Annual cycles of infection re indicated by relationships between changes parasite maturation and in seasonal abundance. ilton-ORNL)
7-03053

THE EFFECT OF TEMPERATURE-SALINITY COMBINATIONS ON THE FUNCTIONAL WELL-BEING OF ADULT LYTECHINUS VARIEGATUS (LAMARCK) (ECHINODERMATA, ECHINOIDEA),
University of South Florida, Tampa. Dept. of Biology.
J. M. Lawrence.
Journal of Experimental Marine Biology and Ecology, Vol. 18, p 271-275, 1 tab, 15 ref.

Descriptors: *Environmental effects, *Salinity, *Temperature, Aquatic life, *Florida, Coasts, *Gulf of Mexico, Water temperature.
Identifiers: *Sea urchins, Lytechinus variegatus.

In 1971 large, dense aggregations of sea urchins were observed off the Florida Gulf coast. The aggregations were active in August and September but were dispersed with many dead individuals in October. The purpose of the present work was to ascertain the effect of various combinations of temperature and salinity on the viability of the sea urchins. The highest activity coefficient was found to be at 35% salinity and 28C. Increases in temperature and salinity above ambient levels had more effect on the urchins than decreases in temperature and salinity. A reduction of salinity to 25% along with an increase in temperature to 34C caused death of the urchins, while this level of reduction of salinity along with a decrease in temperature only reduced their viability. The area where the mass mortalities occurred is marked by large quantities of river discharge during rainy seasons and the waters are shallow resulting in extreme temperatures. (Chilton-ORNL)
W77-03054

DISTRIBUTION OF FISH SPECIES IN GREAT BEAR LAKE, NORTHWEST TERRITORIES, WITH REFERENCE TO ZOOPLANKTON, BENTHIC INVERTEBRATES, AND ENVIRONMENTAL CONDITIONS,
Fisheries and Marine Service, Winnipeg (Manitoba). Freshwater Inst.
L. Johnson.
Journal of the Fisheries Research Board of Canada, Vol. 32, No. 11, 1975, p 1989-2004, 8 fig, 6 tab, 47 ref.

Descriptors: *Environmental effects, *Competition, Ecosystems, Lakes, Oligotrophy, Arctic, *Zooplankton, Benthos, Benthic fauna, *Invertebrates, *Canada, *Distribution, Fish.
Identifiers: Species diversity, *Great Bear Lake(NWT).

Great Bear Lake is extremely oligotrophic and this is considered to have had the effect of reducing species diversity in the lake. Highest concentrations of benthic invertebrate were found in the upper 20 m with only Mysis relicta and Myoxocephalus quadricornis existing in measurable densities below 100 m. Salvilinus namaycush and M. quadricornis were found at depths from 3-400 m and at temperatures of 13.2C for M. quadricornis and 15C for S. namaycush. Whitefish were found only in the bays. Stizostedion vitreum, Lota lota, and Catostomus catostomus were found only at the periphery of the lake. Couesius plumbeus and Percopsis omiscomaycus were found in the headwaters and in Great Bear River but not in the lake. It was suggested the low number of species present in some arctic lakes is due to environmental or competitive exclusion rather than to ecosystem immaturity. (Chilton-ORNL)
W77-03055

REPRODUCTION OF WHITE PERCH IN THE LOWER HUDSON RIVER,
New York Power Pool, Schnectady, N. Y. Environmental Affairs Office.
For primary bibliographic entry see Field 2L.
W77-03058

INVESTIGATION OF THE SALMON (SALMO SALAR) SMOLT MIGRATION OF THE BIG SALMON RIVER, NEW BRUNSWICK, 1966-72,
Fisheries and Marine Service, Halifax (Nova Scotia). Dept. of Environment.
B. M. Jessop.
Technical Report Series No. MAR/T-75-1, 57 p, 5 fig, 28 tab, 30 ref, 6 append.

Descriptors: *Ecology, *Biorhythms, *Migration, Fish behavior, *Fish migration, *Smolt, *Salmon, Data collections, Water flow, Temperature, Size, Fish populations, Timing, *Canada.
Identifiers: Big Salmon River(NB).

A counting fence near the mouth of the Big Salmon River was used to collect data on the timing and duration of Atlantic salmon smolt migration, and on smolt numbers, sizes, sex ratios, and ages. During each year of the study, the timing of smolt migration was between May 7-28 to June 15-July 13. The 6 year mean average of numbers of smolt counted was 15,570. A relationship was observed between timing of the smolt run and water level and water temperature. Most smolts (90%) migrated at night but the number of smolts migrating during daylight hours increased during the latter part of the run. Mean smolt lengths ranged from 13.5 to 15.1 cm and were significantly different between years. Smolt yield for all ages was 4.0/100 sq. meters. (Chilton-ORNL)
W77-03059

5D. Waste Treatment Processes

SOME INTERNAL MEASURES FOR REDUCING EFFLUENT LOAD, FOR EXAMPLE, IN A CALCIUM BISULFITE MILL (EINIGE INNERBETRIEBLICHE MASSNAHMEN ZUR VERMINDERUNG DER VORFLUTERBELASTUNG, DARGESTELLT AM BEISPIEL EINER CALCIUMBISULFITFABRIK),
Schwaebische Zellstoff A. G., Ehingen/Donau (West Germany).
J. P. Franzreb.
Das Papier, Vol. 30, No. 9, p 384-389, September, 1976. 6 fig, 4 ref.

Descriptors: *Pulp wastes, *Water pollution control, *Bleaching wastes, *Sulfite liquors, Lignins, Wastes, Industrial wastes, Pollutants, Water pollution sources, Evaporators, Acids, Chlorination.
Identifiers: *Sulfite pulp mills, Lignosulfonic acids, Condensates, Alkaline extraction, Chlorolignins, Spills, Pulp washing, Pulp bleaching, Wood extractives.

Collection of at least 98% of the waste liquor is the primary measure proposed. The proposed combination of diffusion and filter washing has proved effective with fir and beech. A closed separation (screen room) with no effluent is included. Such extensive effluent control will have long-term success only with elimination of accidental spills. A possible solution is described. Three types of water pollutants may come from evaporator condensates: lignosulfonic acids, volatile neutral compounds like furfural and methanol, and volatile acids like acetic. Reduction of contamination by each of these types is discussed. Effluent contamination from the bleach plant is a special problem; 70-90% of this results from the chlorination and alkaline extraction steps. A possible measure for reducing chlorolignins and alkaline extractives in the bleaching effluent is described. (Ward-IPC)
W77-02576

PURIFICATION OF WASTE WATERS AT CELLULOSE ATTISHOLZ (EPURATION DES EAUX RESIDUAIRES A LA FABRIQUE DE CELLULOSE DE ATTISHOLZ),
Papier, Carton et Cellulose, Vol. 25, No. 8/9, p 54-55, August/September, 1976. 1 fig, 2 illus.

Descriptors: *Pulp wastes, *Treatment facilities, *Waste water treatment, Water pollution treatment, Water pollution sources, Wastes, Industrial wastes, Biological treatment, Sludge treatment, Dewatering, Incineration, Bark, Europe, Foreign countries, Waste treatment, Water pollution control, Pulp and Paper industry.
Identifiers: *Switzerland.

The effluent treatment facilities at Cellulose Attisholz AG., Switzerland, are briefly described, including the physicochemical treatment stage, biological treatment stage, and the dewatering and incineration stage for sludge and bark residues. (Speckhard-IPC)
W77-02577

WATER RESOURCE MANAGEMENT IN THE CZECHOSLOVAKIAN PAPER INDUSTRY DURING THE FIFTH FIVE-YEAR PLAN PERIOD (VODNI HOSPODARSTVI PAPIRENSKEHO PRUMYSLU CSR V PATE PETILETCE),
For primary bibliographic entry see Field 3E.
W77-02578

DETERMINATION OF MONOHYDRIC LOW-MOLECULAR PHENOLS IN SPENT LIQUORS AND PULP MILL EFFLUENTS (BADANIA NAD OZNACZANIEM JEDNOWODOROTLENOWYCH NISKOCZASTECZKOWYCH ZWIAZKOW FENOLOWYCH W LUGACH I SCIEKACH Z CELULOZOWNI),
For primary bibliographic entry see Field 5A.
W77-02579

POSSIBILITY OF INTRODUCING WASTE-FREE TECHNOLOGY IN THE PULP AND PAPER INDUSTRY (VOZMOZHNOSTI VNEDRENIYA BEZOTKHODNOI TEKHNOLOGII V OTRASLI),
For primary bibliographic entry see Field 3E.
W77-02583

AUTOMATION OF TOTAL PHENOLIC CONTENT DETERMINATION WITH THE FOLIN-CIOCALTEU REAGENT. APPLICATION TO THE STUDY OF WASTE WATERS FROM FIBERBOARD MILLS (AUTOMATISATION DE LA METHODE DE DOSAGE DES COMPOSES PHENOLIQUES TOTAUX PAR LE REACTIF DE FOLIN-CIOCALTEU. APPLICATION A L'ETUDE DES EAUX RESIDUAIRES DES USINES DE PANNEAUX DE FIBRES DE BOIS),
Institut National de la Recherche Agronomique, Dijon (France). Technologie.
For primary bibliographic entry see Field 5A.
W77-02584

MODELING OF ORGANIC COMPONENTS IN ALKALINE EFFLUENTS FROM KRAFT PULP PRODUCTION. I. STUDY OF LIGNIN DECOMPOSITION PRODUCTS (MODELIROVANIE ORGANICHESKIKH KOMPONENTOV SHCHELOKOSODERZHASHCHIKH STOCHNYKH VOD SUL'FATNO-TSELLYULOZNOGO PROIZVODSTVA. I. ISSLEDOVANIE PRODUKTOV RAZRUSHENIYA LIGNINA),
Vsesoyuznyi-Nauchnyi Planovii Otdel Bumazhnoi Promyshlennostn Moscow (USSR).
For primary bibliographic entry see Field 5B.
W77-02585

MODELING OF ORGANIC COMPONENTS IN ALKALINE EFFLUENTS FROM KRAFT PULP PRODUCTION. II. PHYSICOCHEMICAL PROPERTIES OF LIGNIN DECOMPOSITION PRODUCT (MODELIROVANIE ORGANICHESKIKH KOMPONENTOV SHCHELOKOSODERZHASHCHIKH STOCHNYKH VOD SUL'FATNO-TSELLYULOZNOGO PROIZVODSTVA. II. FIZIKOKHIMICHESKAYA KHARAKTERISTIKA PRODUKOV RAZRUSHENIYA LIGNINA),
Vsesoyuznyi Nauchnyi Planovii Otdel Bumazhnoi Promyshlennost Moscow (USSR).
For primary bibliographic entry see Field 5B.
W77-02586

MODELING OF ORGANIC COMPONENTS IN ALKALINE EFFLUENTS FROM KRAFT PULP PRODUCTION. III. STUDY OF CARBOHYDRATE DECOMPOSITION PRODUCTS (MODELIROVANIE ORGANICHESKIKH KOMPONENTOV SHCHELOKOSODERZHASHCHIKH STOCHNYKH VOD SUL'FATNO-TSELLYULOZNOGO PROIZVODSTVA. III. IZUCHENIE PRODUCKTOV RAZRUSHENIYA UGLEVODNOI CHASTI DREVESINY),
Vsesoyuznyi Nauchnyi Planovii Otdel Bumazhnoi Promyshlennost Moscow (USSR)
For primary bibliographic entry see Field 5B
W77-02587

INVESTIGATION OF COMMERCIAL CHROME-TANNING SYSTEMS: PART VI. FULL-SCALE TRIALS OF CHROME LIQUOR RECYCLING AND THE IMPORTANCE OF SALT CONCENTRATION,
Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia) Div. of Protein Chemistry.
J. E. Burns, D. E. Colquitt, M. H. Davis, and J. G. Scroggie.
Journal of the Society of Leather Technologists and Chemists, Vol 60, No 4, p 106-112, July/August, 1976. 3 fig, 4 tab, 19 ref

Descriptors: *Tannery wastes, *Waste water treatment, *Recycling, *Chromium, *Industrial wastes, Symbiosis, Reclamation, Chemical wastes, Liquid wastes, Effluents, Water reuse
Identifiers: Tanneries.

A method for recycling chrome tanning liquors which is suitable for short pickling times is described. Spent chrome liquor is used as a base for the preparation of the pickle liquor for the following pack of hides or skins. Between each cycle, the spent liquor is reconstituted by the addition of the full amount of mineral acid normally used in pickling together with a reduced amount of the desired masking agent. The conventionally delimed/bated pelt is then pickled with this liquor for the desired time after which the calculated reduced amount of the chrome reagent is added to give the usual total chromium concentration. Control of ionic strength during pickling/tanning with the recycled liquors is vital for maintaining leather quality, and this can be achieved by simply controlling specific gravity despite a progressive change from a chloride to a sulfate pickle system during the process. The concentration of chromium appearing in the tannery effluent can be greatly reduced with careful attention to the recovery of all chromium-containing liquors. (Kreager-FIRL)
W77-02594

THE CONTROL OF WATER POLLUTION AND THE DISPOSAL OF SOLID WASTES IN THE INDUSTRIES PRODUCING BASIC INORGANIC CHEMICALS,
Imperial Chemical Industries Ltd., London (England). Engineering Services Dept.
F. J. Wagstaffe.
Pure and Applied Chemistry, Vol. 45, No. 3/4, p 141-145, 1976. 7 ref.

Descriptors: *Industrial wastes, *Chemical industry, *Waste water treatment, *Recycling, *Chemical wastes, Solid wastes, Suspended solids, Separation techniques, *Inorganic compounds, Bubbles, Flocculation, Mercury, Calcium sulfate.
Identifiers: Magnetic separation.

Developments in the control of water pollution generated by the basic inorganic chemicals industry are reviewed. The use of diaphragm cells rather than mercury cells for the manufacture of chlorine is one means of reducing mercury pollution from chlor-alkali plants. A development in the removal of suspended solids from effluents containing a few hundred milligrams/liter of such solids involves the use of tube modules in conventional horizontal flow clarifiers. A technique in which gas bubbles are induced to attach themselves to flocculated solids permits the removal of the solids and floc in an overflow rather than an underflow manner. High gradient magnetic fields are being used to remove finely divided magnetic solids from aqueous streams. The recovery of waste calcium sulfate from the manufacture of phosphoric and hydrofluoric acids is being investigated as a solution to the inorganic chemicals industry's most important single solid waste disposal problem. (Kreager-FIRL)
W77-02595

INCINERATION OF INDUSTRIAL WASTES,
Minnesota Mining and Mfg. Co., St. Paul
For primary bibliographic entry see Field 5E.
W77-02596

THE CATALYTIC WET OXIDATION OF STRONG WASTE WATERS,
Catalytic Inc., Charlotte, N. C.
A. K. Chowdhury, and L. W. Ross.
American Institute of Chemical Engineers Symposium Series, Vol. 71, No. 151, p 46-58, 1975. 1 fig, 10 tab, 11 ref

Descriptors: *Oxidation, *Catalysts, *Waste water treatment, *Chemical oxygen demand, *Organic compounds, Liquid wastes, Chemical wastes, Kinetics, Chemical reactions, Pressure, Temperature, Oxygen, Efficiencies, Performance Evaluation, Sulfates, Iron compounds, Copper sulfate, Oxides
Identifiers: Fenton catalysts, Platinum oxide, Hydrogen peroxide

Catalysts for the wet oxidation of strong waste waters (chemical oxygen demand of 3500-15,000) were investigated. Copper sulfate, ferric sulfate and hydrogen peroxide were the most effective catalysts over a wide pH range (2.8-7.0), with typical chemical oxygen demand reductions of over 95% being achieved at 400 F. Fenton catalyst produced comparable results but only at a pH of 2.5. Platinum oxide gave the best results among various solid catalysts tested. The pressure of the reaction system did not exert any effect on catalytic wet oxidation over a range of 300-900 pounds/sq in. Air was as effective as oxygen in carrying out the oxidation reactions as long as adequate oxygen was maintained with proper stirring. Beyond temperatures of 400 F, a leveling of of the catalytic oxidation rate was observed. Catalytic oxidation of waste water obeyed first order kinetics. Wet oxidation is most effective when the organic content of the solution to be treated is high (chemical oxygen demand of more than 3500 milligrams/liter); thus the efficient operation of the process, a pretreatment step for increasing the organic concentration is necessary. (Kreager-FIRL)
W77-02597

APPLICATION OF ULTRA FILTRATION REVERSE OSMOSIS TECHNIQUE FOR THE FRACTIONATION OF CHEESE WHEY - A WASTE DISPOSAL OF THE DAIRY INDUSTRY,
Central Salt and Marine Chemicals Research Inst., Bhavnagar (India)
A. V. Rao, B. J. Bhalala, and D. J. Mehta.
Indian Chemical Journal Vol. 10, No. 12, p 19-23, June, 1976. 3 fig, 2 tab, 4 ref

Descriptors: *Dairy industry, *Food processing industry, *Filtration, *Reverse osmosis, *Waste

vater treatment, Byproducts, Recycling, Separa-ion techniques, Liquid wastes, Proteins, Chemi-al oxygen demand, Industrial wastes, Efficien-ies, Performance, Membrane processes, Mem-ranes, Water reuse, Nutrients.
dentifiers: Sugars, Lactose.

Jltrafiltration membrane optimization studies vith cellulosic polymers were conducted to levelop a suitable membrane for the separation of rotein and lactose from cheese whey which is ften disposed of as liquid waste. Protein rejection y the membrane was maintained at over 90% hroughout the entire operation, and lactose rejec-ion was kept at a minimum of 2.0%. About 80% of he lactose and 70% of the protein originally resent in the cheese whey appear to be recovera-le in the ultrafiltrate and concentrate, respective-y. The ultrafiltrate can be further concentrated in reverse osmosis unit to reduce the chemical ox-gen demand level of the protein-free filtrate. The ermeate from this second stage can then be eused in dairies as fresh water. (Kreager-FIRL)
W77-02598

AEROBIC AND ANAEROBIC MICROBIAL TREATMENT ALTERNATIVES FOR SHELLFISH PROCESSING WASTEWATERS IN CONTINUOUS CULTURE,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
F. G. Pohland, and J. W. Hudson.
Biotechnology and Bioengineering, Vol. 18, No. 9, p 1219-1247, September, 1976. 13 fig, 2 tab, 11 ref.

Descriptors: *Food processing industry, *Waste water treatment, *Biological treatment, *Aerobic conditions, *Anaerobic conditions, Kinetics, Model studies, Microorganisms, Organic compounds, Solid wastes, Separation techniques, Hydraulics, Methane, Efficiencies, Oxidation, Shellfish, Industrial wastes.
Identifiers: Shellfish processing.

Aerobic and anaerobic microbial treatment of shellfish processing waste water were investigated, and a kinetic model based on continuous culture kinetics was developed for the former treatment scheme. Aerobic oxidation of shellfish processing waste water were investigated, and a kinetic model based on continuous culture kinetics was developed for the former treatment scheme. Aerobic oxidation of shellfish processing waste water proved to be a satisfactory means of reducing soluble organic constituents to acceptable levels and the results of bench-scale studies were amenable to continuous culture analysis with kinetic models which enabled certain design and/or operational criteria to be formulated. A critical hydraulic retention time about 2 hr was estimated for single-pass treatment modes; and with solids recycle, the critical hydraulic retention time could be reduced to about 1 hr. The efficiency of biological solids separation was markedly affected by changes in applied dilution rates and was of major importance in determining the best operating mode and overall system performance. The kinetic description of anaerobic biological treatment using continuous culture analysis was not achieved. However, anaerobic treatment exhibited a limited potential for waste water stabilization in that soluble substrate removals and methane production occurred at all retention times. Solids recycle tended to increase treatment efficiencies in both aerobic and anaerobic processes. (Kreager-FIRL)
W77-02599

SYNCRUDE VOWS ENVIRONMENTAL RESPONSIBILITY,
Syncrude Canada Ltd., Edmonton (Alberta).
O. Tost.
Hydrocarbon Processing, Vol. 55, No. 10, p 102-106, October 1976. 1 fig.

Descriptors: *Oil industry, *Reclamation, *Mining, *Oil wastes, *Environmental engineering, Industrial wastes, Revegetation, Runoff, Erosion, Surface water, Research priorities, Programs.

Syncrude's environmental protection program for its 17,000-acre synthetic crude oil projects in Alberta, Canada's Athabasca Tar Sands, the worlds' largest open pit mining and reclamation operation, is outlined. Initial environmntal work was started by Syncrude in 1962 and centered on broad baseline studies of the surrounding soil, vegetation, water, animal and bird populations, and atmospheric patterns. About $300 million is being spent on environmental research and pollution control systems for the open pit mining operation which is projected to come on stream in mid-1978. Syncrude's long-range goal is to revegetate with native grasses and trees the 10 sq mi comprising the mine site once the area is mined out. The most difficult task is expected to be establishing growth on the tailings dike that surrounds the 10-square-mile tailings pond in order to prevent erosion and washout and to contain runoff from polluting nearby rivers and streams. The dike which will range from 10-180 ft high will contain the sand, water, and unrecoverable effluent from the bitumen extraction process. (Kreager-FIRL)
W77-02600

WASTEWATER REQUIREMENTS MULTIPLY SOLIDS PROBLEMS,
Texas Univ. at Dallas, Richardson.
For primary bibliographic entry see Field 5G.
W77-02601

IMPACT OF WATER CONSERVATION IN THE DESIGN OF MODERN OIL REFINERIES,
Fluor Engineers and Constructors, Inc., Los Angeles, Calif.
H. J. Klooster, and R. A. Beardsley.
American Institute of Chemical Engineers Symposium Series, Vol. 71, No. 151, p 14-24, 1975. 4 fig, 7 tab, 4 ref.

Descriptors: *Oil industry, *Reclaimed water, *Water conservation, *Water reuse, *Waste water treatment, Industrial wastes, Liquid wastes, Symbiosis, Reclamation, Ammonia, Hydrogen sulfide, Dewatering, Sludge, Filtration, Recycling, Design.

Water conservation measures for modern oil refineries are outlined. The first step in the process of reducing waste effluents is to segregate wastes streams according to the degree of treatment required. Sour condensates produced in crude units and hydrocrackers can be reused as crude condenser wash water, desalter wash water, and/or recycled water for the hydrocracker after simple stream stripping to remove ammonia and hydrogen sulfide. High mineral, non-toxic salt concentrated streams which are not contaminated with organics can be reused for various process requirements after desalination and/or mechanical evaporation. Some waste streams containing non-hardness and non-siliceous mineral salts but otherwise contaminated with organics may be used as cooling tower makeup. Filter backwash may be recycled to the inlet of the clarifier without any added treatment, and the recycled filtrate may aid in the solids settling rate in the clarifier, thereby enhancing the clarifier operation. Decant water from sludge dewatering may also be recycled to the clarifier feed. (Kreager-FIRL)
W77-02602

EIGHTH MEETING OF THE IULTCS TANNERY WASTES COMMISSION, SVENDBORG, DENMARK, 21ST TO 23RD MAY 1975.
Journal of the Society of Leather Technologists and Chemists, Vol 60, No 4, p 95-105, July/August, 1976. 7 tab, 18 ref.

Descriptors: *Tannery wastes, *Waste water treatment, *Biological treatment, *Water reuse, *Waste disposal, Solid wastes, Sludge, Denitrification, Filtration, Separation techniques, Industrial wastes, Membranes, Oxygen demand, Chromium, Sulfides, Sewage, Effluents, Physical control, Analytical techniques, Byproducts, Symbiosis, Toxicity.
Identifiers: Tanneries.

The following annual reports on topics dealing with tannery wastes were presented at the eighth meeting of the IULTCS Tannery Wastes Commission. Methods for Depilation (W. Frendrup); Improvements in the Uptake of Tannins by Skin (A. J. J. van Meer); Sulphide Oxidation (A. J. J. van Meer); Methods of Biological Treatment (A. J. J. van Meer); Toxic Effects of Sulphide and Chromium (D. R. Corning); Mixing of Tannery Effluent with Domestic Sewage (W. Frendrup); Sludges - Storage and DIsposal (M. Aloy); Specific Criteria for the Discharge of Tannery Effluents (J. Gauglhofer); Charging for Tannery Waste Water Disposal (Mr. van Vlimmeren); Disposal of Solid Wastes (L. Feikes); Reuse of Water (B. Gorecki and J. Ludvik); and Chemical Treatment of Tannery Effluents (L. Feikes and L. Del Pezzo). In addition to these topics, the following other subjects were discussed: new developments in the treatment of tannery wastes, chromium recovery methods, sludge applications in agriculture, denitrification studies, the organization of an international symposium on tannery wastes, analytical methods for determining oxygen demand parameters, membranes for ultrafiltration units, statistics on the incidence of anthrax, and the maximum admissible concentration limits for aluminum in waste water. (Kreager-FIRL)
W77-02603

HANDLING DISCHARGES FROM WASTE OIL PROCESSING,
Recon Systems, Inc., Princeton, N.J.
N. J. Weinstein, and R. M. Wolfertz.
Industrial Wastes, Vol 22, No 5, p 50-52, September/October, 1976. 2 fig, 4 tab.

Descriptors: *Oil industry, *Sludge disposal, *Waste water treatment, *Oil wastes, *Waste disposal, Recycling, Separation techniques, Neutralization, Lagoons, Landfills, Industrial wastes, Chemical wastes, Dissolved solids, Suspended solids, Phenols, Metals, Organic compounds, Byproducts.
Identifiers: Oil re-refining.

The treatment and disposal of sludges and waste waters generated during oil re-refining operations are reviewed. Acid sludge which contains metals, combustibles, and oil must be handled carefully because of its high acid content, and currently all acid sludge disposal by refineries in the United States is to landfills or lagoons, usually without neutralization. Spent clay is ordinarily disposed of to landfills, although some uses for it have been found, for example, unpaved road stabilization. Other wastes such as filter and centrifuge sludges, tank cleaning sludges, furnace coke, combustion ash, waste water flocs, and scums are normally disposed of with refuse or separately landfilled, although oil recovery by dewatering and blending may be practices on some tank sludges. Distillation bottoms are either stored in lagoons or used as an asphalt blending stock. Oil/water separation and neutralization are used to treat process waste water, and cooling water is sometimes recycled or occasionally joined to other waste streams entering an oil/water separator. Waste water from oil re-refining operations generally contains traces of metals, dissolved and suspended solids, dissolved phenols, and other organics. (Kreager-FIRL)
W77-02604

POLLUTION CONTROL IN INDIAN STEEL INDUSTRY,
Regional Engineering Coll., Rourkela (India). Dept. of Metallurgical Engineering.

For primary bibliographic entry see Field 5B.
W77-02605

CHEMICAL PULPING,
For primary bibliographic entry see Field 5B.
W77-02606

BIOLOGICAL PROCESS FOR EFFLUENT AND WASTE TREATMENT AS APPLIED IN THE PAPER INDUSTRY,
B. Morgeli, and J. Gnieser.
Sulzer Technical Review, Vol. 58, No. 2, p 85-88, 1976. 6 fig, 1 tab, 10 ref.

Descriptors: *Pulp and paper industry, *Biological treatment, *Activated sludge, *Pulp wastes, *Waste water treatment, Industrial wastes, Microorganisms, Biodegradation, Aeration, Liquid wastes, Recycling.

The use of biological treatment for purifying liquid wastes generated by the pulp and paper industry is discussed. A biological treatment process which is capable of accommodating operational disturbances and variations in the quality and quantity of the waste to be treated is outlined and involves the use of activated sludge treatment with sludge reaeration. Return sludge for the biological treatment is prepared in a separate sludge tank in which the microorganisms that are grown in the activation tank remain alive for longer periods of time. The return sludge can thus not only be supplied to the process in metered quantities but can also be altered in terms of microorganism activity. (Kreager-FIRL)
W77-02607

ADVANCED TREATMENT OF PULP WASTE WATER (PARAPU HAISUI NO KODO SHORI),
M. Koseki, and N. Mimoto
Sumitomo Jukikai Giho (Sumitomo Shipbuilding and Machinery), Vol. 24, No. 71, p 88-92, August, 1976. 12 fig, 4 tab, 5 ref.

Descriptors: Pulp and paper industry, *Activated sludge, *Waste water treatment, *Adsorption, *Coagulation, Activated carbon, Sedimentation, Biological treatment, *Pulp wastes, Chemical wastes, Industrial wastes, Liquid wastes, Evaluation, Performance.

Activated sludge treatment of pulp waste water was evaluated. Activated sludge treatment not only improved water quality but also permitted a large reduction in the chemical dosage required for subsequent coagulation-sedimentation. Activated sludge treatment also permitted greater adsorption of pollutants during activated carbon treatment. Chemical oxygen demands of less than 200 milligrams/liter appear to be attainable by using a combination of activated sludge, coagulation-sedimentation, and activated carbon adsorption treatment. (Kreager-FIRL)
W77-02608

SOME INTERNAL MEASURES FOR THE REDUCTION OF THE EFFLUENT LOAD SHOWN BY THE EXAMPLE OF A CALCIUM-BISULPHITE PULPMILL (EINIGEINNERBETRIEBLICHE MASSNAHMEN ZUR VERMINDERUNG DER VERFLUTERBELASTUNG, DARGESTELLT AM BEISPIEL EINER CALCIUMBISULFIT-FABRIK),
J. P. Franzreb.
Das Papier, Vol. 30, No. 9, p 384-389, September, 1976. 6 fig, 4 ref.

Descriptors: Pulp and paper industry, *Waste water treatment, *Sulfite liquors, *Pulp wastes, *Bleaching wastes, Effluents.

A number of different measures are proposed for the reduction of effluent load at a calcium bisulphite pulpmill. First is the collection of at least 98% of the digester waste liquor. A combination of diffusion and filter washing with effluent-free closed separation has proved effective for fir and beech wood. The success of such an operation depends on the exclusion of uncontrolled accidental losses. Three groups of damaging materials are distinguished which can lead to secondary contamination as evaporation condensates; the problem of their reduction is discussed. From 70-90% of effluent contamination by bleaching plant effluents result from the chlorination and/or alkaline extraction step. Measures to eliminate this are described. (Miller-FIRL)
W77-02609

WASTE TREATMENT ADVANCES: WASTE WATER TREATMENT VIA ACTIVATED CARBON,
Calgon Corp., Pittsburgh, Pa.
D. G. Hager.
Chemical Engineering Progress, Vol. 72, No. 10, p 57-60, October, 1976. 5 tab, 7 ref.

Descriptors: *Activated carbon, *Adsorption, *Textiles, *Waste water treatment, *Treatment facilities, Color, Carbon, Organic compounds, Phenols, Efficiencies, Performance, Evaluation, Chemical wastes, Industrial wastes
Identifiers: Textile industry.

The effectiveness of activated carbon adsorption in reducing total organic carbon, color, and phenol was evaluated for 107 industrial waste water samples, including 16 samples from the textile industry. Total organic carbon removals of greater than 85% were observed in 79 out of 102 samples; 95% color removal was observed in 16 out of 16 samples, and 99% phenol removal was achieved in 5 out of 5 samples. A total of 15 full-scale industrial adsorption systems have been placed in operation throughout the United States since 1973 to treat a variety of dissolved organic contaminants. Flows range from 6000 to more than 1 million gallons/day, with carbon contact times ranging from 8 min to about 23 hr. All of the plants rely on off-site carbon reactivation. (Kreager-FIRL)
W77-02610

QUEBEC ENVIRONMENTAL REGULATIONS IN THE TEXTILE INDUSTRY...AND ONE COMPANY'S SOLUTION,
For primary bibliographic entry see Field 5G.
W77-02611

TREATING EFFLUENT CONTAINING COMPOUNDS PREF. DYES - BY ADDING SALT GENERATOR OF OPPOSITE CHARGE TO EFFLUENT ION THEN ULTRA-FILTERING.
Belgian Patent BE-838-926. Issued August 25, 1976. Derwent Belgian Patents Abstracts, Vol. X, No. 37, p D2, October 10, 1976.

Descriptors: *Patents, *Tannery wastes, *Waste water treatment, *Filration, *Separation, Chemical reactions, Ions, Salts, Industrial wastes, Chemical wastes, Membranes, Pressure.
Identifiers: Tanneries, Ultrafiltration, Salt formation.

A patent for a process that removes water-soluble ionic compounds from tanning effluents is described. The process involves the addition of a water-soluble salt generator which carries a charge that is opposite that on the ionic compound to be removed. This salt generating compound is prefereably of high molecular weight. After salt formation, the effluent is subjected to ultrafiltration under pressure. High flow rates can be obtained with the method, and a semi-permeable membrane which would be unsuitable for filtering the untreated effluent may be used to filter the treated effluent. (Kreager-FIRL)
W77-02612

AIR AND WATER PURIFICATION - WITH ACID CHLORITE SOLUTION.
German Patent DS 2223-790. Issued August 26, 1976. Derwent German Patents Abstracts, Vol. X, No. 36, p D2, October 13, 1976.

Descriptors: *Patents, *Tannery wastes, *Air pollution, *Waste water treatment, *Industrial wastes, Pollution abatement, Gases, Liquid wastes, Nitrogen compounds, Sulfur compounds, Hydrogen sulfide, Alcohols, Organic acids, Acidity, Chemical reactions
Identifiers: Mercaptans, Fatty acids.

A patent for a tanning waste purification process is described. Both waste gases and waste waters containing alcohols, aldehydes, fatty acids, and sulfur and nitrogen-containing compounds like hydrogen sulfide, mercaptans, and tryptophane are purified by treatment with alkali or alkaline earth chlorites in an acid medium at a pH of less than 6 and a temperature of 80 C. The process results in the formation of nontoxic products in an inexpensive manner and without the risk of explosion. (Kreager-FIRL)
W77-02613

LEATHER INDUSTRY EFFLUENT PURIFICATION - BY ACIDIFICATION PRIOR TO LIME TREATMENT AND SEPARATION BY FLOTATION.
Soviet Patent SU-487-024. Issued February 25, 1976. Derwent Soviet Inventions Illustrated, Vol. X, No. 35, p D4, October 6, 1976.

Descriptors: *Patents, *Tannery wastes, *Waste water treatment, *Lime, *Flotation, *Separation techniques, Chromium, Proteins, Suspended solids, Chemical wastes, Industrial wastes, Liquid wastes, Acidity, Alkalinity.
Identifiers: Tanneries, Leather industry.

A patent for a tannery effluent purification process is described. The process involves a lime treatment and pressure flotation separation. Protein, chromium compounds, and suspended solids are better removed by prior acidification of the effluent to a pH of 4.5. After this initial step the deposit is removed in a flotation tank, and the pH of the effluent is adjusted to 7.5-8.0 with lime. Final separation is achieved by pressure flotation. (Kreager-FIRL)
W77-02614

THE PURIFICATION OF INDUSTRIAL EFFLUENT.
Australian Patent 473,544. Issued June 24, 1976. The Australian Official Journal of Patents, Trade Marks, and Designs, Vol. 46, No. 22, p 2192, June 24, 1976.

Descriptors: *Tannery wastes, *Waste water treatment, *Patents, *Flocculation, *Industrial wastes, Liquid wastes, Chemical wastes, Chemical properties.
Identifiers: Tanneries

A patent for a flocculant compostion that may be used for purifying effluents from tanneries, textile plants, paper mills, and dyestuff or optical brightener manufacturing processes is described. The flocculant composition consists of a condensation product of dicyandiamide or dicyandiamidine, formaldehyde, and an alkylene polyamine having two to eight carbon atoms. (Kreager-FIRL)
W77-02615

MUNICIPAL WASTEWATER RECYCLING: STRATEGY FOR MEETING THE ZERO DISCHARGE GOAL OF PL 92-500,
California Univ., Los Angeles. School of Architecture and Urban Planning.
A. Herson.

ilable from the National Technical Informa- Service, Springfield, VA 22161 as PB-261 912, e codes: A07 in paper copy, A01 in microfiche. ruary 1976. (California Water Resources ter Project UCAL-WRC-W-503).

criptors: *Waste water treatment, *Water se, *Recycling, *Municipal wastes, Federal er Pollution Control Act, Irrigation.
ntifiers: *Zero discharge, *Federal Water Pol- on Control Act Amendments(1972).

eral factors are responsible for increased in- st in reusing municipal wastewater during the few years. First, in many areas of the country, er--particularly for irrigation--is in short ply. Second, advances in wastewater engineer- have made possible higher efficiencies in the oval of pollutants from municipal effluent. rd, concern about the quality of man's environ- t in general, and concern about the quality of nation's water resources, in particular, have n increasing. The increased emphasis on en- nmental quality has led to new national laws, most important of which, in the context of tewater reuse, is the Federal Water Pollution trol Act Amendments of 1972 (PL 92-500). The tionship between this far reaching law and the lementation of wastewater reuse projects is ewed. (Snyder-California, Davis)
7-02620

ROVING DESIGN CRITERIA FOR SEPTIC NK SYSTEMS,
ansas Univ., Fayetteville. Dept. of Civil En- ering.
Mitchell.
ilable from the National Technical Informa- Service, Springfield, VA 22161 as PB-262 006, e codes: A03 in paper copy, A01 in microfiche. ansas Water Resources Research Center, etteville, Publication No. 42, August 1976. 41 fig, 2 tab. OWRT A-027-ARK(1).

criptors: *Septic tanks, Percolation, *Design eria, *Waste water treatment, Water pollution rces.
ntifiers: *Absorption field design(Septic tanks).

purpose is to determine the biodegradation acity of various sizes and depths of washed r gravel. The results of the laboratory analysis nfluent and effluent wastewater are discussed ey relate to the establishment of the most effi- t biodegradation size and depth of the column. biodegradation capacity of each lysimeter was uated in terms of COD removal, total inor- c nitrogen removal and phosphate removal in tion to dosage rates, loading rates and pH. In meters containing river gravel passing a 3/8 sieve, degradation as measured by COD, sphate and nitrogen removal varied directly increasing depth. A higher degradation effi- cy was achieved in lysimeters containing river el passing a number 4 sieve. The variation in) removal in lysimeters of increasing depth is pronounced for the fine material. The signifi- ly higher removal in lysimeter 3 with a Cu of nd D10 of 0.4 mm. compared to lysimeter 11 of tical depth and material passing a 1/2 inch e but having a Cu of 3.3 and a D10 of 4.2 mm. hasize the importance of soil characteristics vaste absorption. An absorption field with an tion of twelve inches of gravel passing a ber 4 sieve with a Cu of 30 and a D10 of 0.4 , would provide COD removal of 90% or e at minimum dosage rates calculated accord- o Bulletin No. 9 by the Arkansas State Depart- t of Health.
-02621

TATEMENT OF CONCERNS AND SUG- TED ECOLOGICAL RESEARCH, REPORT MBER 1 OF THE LAKE MICHIGAN COOL- WATER STUDIES PANEL.
Michigan Cooling Water Studies Panel, ago, Ill.

For primary bibliographic entry see Field 5C.
W77-02636

ECONOMIC MODELS OF WASTER USE, (RANN UTILIZATION EXPERIENCE, CASE STUDY NUMBER 4),
Houston Univ., Tex.
For primary bibliographic entry see Field 6C.
W77-02640

TWO DEVICES FOR REMOVING SUPERSATURATING GASES IN AQUARIUM SYSTEMS,
Fisheries and Marine Service, St. John's (Newfoundland). Biological Station.
For primary bibliographic entry see Field 5G.
W77-02706

REMOVAL OF TOXIC CHEMICALS FROM WATER WITH ACTIVATED CARBON,
Bureau of Sport Fisheries and Wildlife, La Crosse, Wis. Fish Control Lab.
U. K. Dawson, L. L. Marking, and T. D. Bills.
Transactions of American Fisheries Society, Vol. 105, No. 1, p. 119-123, 1976. 2 tab., 23 ref.

Descriptors: *Hydrogen ion concentration, *Waste water treatment, *Adsorption, *Toxins, *Piscicides, Pesticides, Water purification, *Filtration, *Pesticide removal, *Temperature, *Activated carbon, *Carbon filters, Chemicals, Pollution abatement, Impaired water quality, Equipment, Laboratory tests, Filters, Rotenone, Antimycin A.
Identifiers: Noxfish, Dibrom, Juglone, MS-222, Benzocaine.

Activated carbon was effective in removing fish toxicants and anesthetics from water solutions. Its capacity to adsorb 3-trifluoromethyl-4-nitrophenol (TFM), antimycin, Noxfish(R) (5% rotenone), Dibrom(R), juglone, MS-222, and benzocaine ranged from 0.1 to 64 mg per gram of carbon. The adsorptive capacity of activated carbon for removal of TFM was determined at several column depths, temperatures, pH's and flow rates. Adsorptive capacity increased when the contact time was increased by reducing the flow rate or increasing the column depth. The adsorptive capacity was not significantly influenced by temperature but was substantially higher at pH 6.5 than at higher pH's tested. A practical and efficient filter for purifying chemically treated water was developed. (Katz)
W77-02707

PHOSPHORUS REMOVAL DEMONSTRATION STUDY USING FERRIC CHLORIDE AND ALUM AT C.F.B. UPLANDS,
Environmental Protection Service, Burlington (Ontario). Waste Water Technology Centre.
W. E. Stepko, and E. E. Shannon.
Technology Development Report EPS 4-WP-74-5, Environmental Protection Service, June, 1974, 63 p., 4 app., 9 fig., 18 tab, 10 ref.

Descriptors: *Waste water treatment, Sludge, Detergents, *Activated sludge, Suspended solids, Sewage treatment, Phosphorus, Aeration, *Canada.
Identifiers: *Phosphorus removal, *Ferric chloride, *Alum, Raw sewage, Aeration tanks, Aeration tank effluents, Raw waste waters, Clarification.

Full scale phosphorus removal studies were conducted on the activated sludge wastewater treatment plant at C.F.B. Uplands. Wastewater characteristics and treatment plant performance were closely monitored under baseline conditions (no chemical addition) and at various ferric chloride and alum addition levels. The addition of either alum at 17.5 mg/l as Al, or ferric chloride at 30 mg/l as Fe was capable of producing a secondary effluent averaging 1 mg/l total phosphorus. The phosphorus removal efficiency was greatly influenced by plant flow. Consistent removals were only obtained with flows at or below plant design, corresponding to secondary clarifier overflow rates of 700 Igal per sq. ft. or less. At flows greater than design, total phosphorus removals were affected by the excessive transport of solids over the secondary clarifier weir. Based upon the addition points (raw sewage, aeration tank or aeration tank effluent) evaluated, all locations were equally effective in removing filterable phosphorus. However, at flows greater than design, better overall phosphorus removals were achieved during the raw sewage (primary) additions. The effect of the 1973 Canadian laundry detergent reformulation upon reducing phosphorus loading to the treatment plant was observed. (Environment Canada)
W77-02738

SELECTED REFERENCES ON PHOSPHORUS REMOVAL,
Environmental Protection Service, Burlington (Ontario). Waste Water Technology Centre.
B. P. LeClair.
Economic and Technical Review Report EPS 3-WP-73-2, Environmental Protection Service, February, 1973, 41p.

Descriptors: *Waste wate treatment, Publications, Phosphorus, Precipation, Nutrients, Bibliographies, Phosphates, Flocculation, Sludge, Microorganisms, Treatment facilities, Sewage effluents.
Identifiers: *Phosphorus removal.

This bibliography is intended to provide investigators interested in phosphorus removal with a comprehensive compilation of the literature. This literature survey is arranged in order of categories related either to the chemicals used for precipitation of, or process used for the removal of phosphorus. Two additional categories, one for patents issued for phosphorus removal processes, the other for dissertations related to phosphorus removal are also included. (Environment Canada)
W77-02740

ADVANCED WASTEWATER TECHNOLOGY, A SELECTIVE CODED BIBLIOGRAPHY,
Environmental Protection Service, Burlington (Ontario). Waste Water Technology Centre.
M. F. D. Hamoda, E. E. Shannon, and N. W. Schmidtke.
Technical Appraisal Report EPS 3-WP-73-1, Environmental Protection Service, February, 1973, 132p.

Descriptors: *Waste water treatment, *Bibliographies, Sludge, Precipitation, Coagulation, Flocculation, Adsorption, Evaporation, Electrodialysis, Ion exchange, Waste disposal, Publications.

In the past decade, research in the area of advance wastewater treatment has proliferated with a resultant increase in the related literature. It has become increasingly difficult for pollution abatement specialists to keep ahead of recent developments. English language literature from 1965 to July 1972 is summarized. Items are listed by treatment process discussed. (Environment Canada)
W77-02741

STORM WATER MANAGEMENT MODEL STUDY, VOLUME I.
MacLaren (James F.) Ltd., Toronto (Ontario); and Proctor and Redfern, Toronto (Ontario).
For primary bibliographic entry see Field 5B.
W77-02743

STORM WATER MANAGEMENT MODEL STUDY, VOLUME II.
MacLaren (James F.) Ltd., Toronto (Ontario); and Proctor and Redfern, Toronto (Ontario).
For primary bibliographic entry see Field 5B.
W77-02744

COMPUTER-AIDED PLANNING OF REGIONAL SLUDGE DISPOSAL SYSTEMS, USER'S MANUAL,
B and P Engineers, Kitchener (Ontario).
F. J. Allan, P. L. Silveston, and W. L. Keay.
Canada-Ontario Agreement on the Great Lakes Water Quality, Research Report No. 46, Environmental Protection Service, Environment Canada, Ottawa, Canada, September 1976, 409p., 60 fig., 38 tab, 10 ref. 10 append. 73-5-8.

Descriptors: *Sludge disposal, Computers, *Planning, Costs, Publications, Administration, *Computer programs, Data collections, Lagoons, Landfills, Regional analysis, Model studies, Waste disposal, *Canada.
Identifiers: Niagara, Ontario, Land disposal.

This training manual introduces potential users to the concepts of computer-aided planning, the models for sludge disposal that are imbedded in the computer programs, and the information which must be developed in order to use the programs. It is a source book for setting up a data collection program to be used with computer-aided planning. It contains the coding which transforms the data into the proper form for processing by a computer. Detailed information is provided on the structure of the computer program, so that it can be modified for special purposes or expanded to handle different planning problems such as refuse disposal. A general purpose computer program applicable to the optimization or regional sludge disposal systems is described. The model upon which the computer program is built is a network of transport routes connecting nodes which represent sources of sewage sludge, intermediate facilities for processing or the temporary storage of sludge (such as vacuum filters or lagoons), and dead-end facilities for ultimate disposal (such as landfill or land spreading sites). (Environment Canada)
W77-02745

EFFECT OF STORAGE ON STORM AND COMBINED SEWERS,
Toronto Univ. (Ontario). Dept. of Civil Engineering.
J. G. Henry, and P. A. Ahern.
Canada-Ontario Agreement on the Great Lakes Water Quality, Research Report No. 34, Environmental Protection Service, Environment Canada, Ottawa, Canada, February 1976, 106p., 27 fig., 19 tab, 27 ref, 2 append. 74-8-1.

Descriptors: *Storage, *Water storage, *Roofs, *Sewers, Storm runoff, Reservoir storage, Costs, Alternative planning, Storm drains, Storm water, *Canada, *Combined sewers, Watershed(Basins).
Identifiers: *Roof ponding, Ontario.

The effect of storage on storm and combined sewers has been investigated for residential subdivision of approximately 100 acres area, under development in Southern Ontario. The storage methods examined were: ponding of rainfall on flat roofs; on-side storage of roof runoff; storage of flows from street gutters at catch basins; and holding reservoirs as part of the sewer network. A hydrograph model for estimating stormwater runoff from residential areas has been developed and incorporated in a computer program. The model was used to determine the outflow hydrograph at the storm sewer outfall from the subdivision for a synthetic two-year design storm. An alternative design, replacing the separate sanitary and storm sewers by combined sewers, was carried out and the outflow hydrograph from a combined sewer network was determined. The effects of different storage methods on the outflow hydrograph were tested for both the separate and combined systems. Substantial reductions in peak flow were found to occur as the level of storage was increased, with holding reservoirs providing the greatest reductions. Cost data from the original separate system design was used to calibrate formulae for estimating sewer pipe costs. The total costs of systems incorporating various storage options were compared. A combined sewer system was found to be slightly less expensive than the separate system and small savings in subdivision sewer costs resulted when storage was incorporated. (Environment Canada)
W77-02746

DIRECT PHYSICOCHEMICAL TREATMENT WITH OZONE,
Sherbrooke Univ. (Quebec). Dept. of Chemical Engineering.
J. P. Jones, and J. Dufort.
Canada-Ontario Agreement on the Great Lakes Water Quality, Research Report No. 32, Environmental Protection Service, Environment Canada, Ottawa, Canada, February 1976, 59p., 21 fig., 5 tab, 9 ref, 3 append. 72-5-16.

Descriptors: *Ozone, *Waste water treatment, *Chemicals, Biochemical oxygen demand, Efficiencies, Suspended solids, *Filtration, *Filters.
Identifiers: Clarification unit, Chemical clarification, Sand filtration, Dual media filters.

A pilot study of direct physicochemical treatment of wastewaters using ozone is described. The pilot plant consisted of three principal elements: a chemical clarification unit, an ozone contact section, and a dual media filter. The chemical clarification unit removed up to 95% of the suspended solids in the raw sewage food. The ozone contact section consisted of four spray contactors. These were generally sufficient to reduce the soluble BOD5 by 40%. The filter served to polish the effluent by removing the last traces of suspended solids. The amount of ozone needed to reduce the BOD5 and the TOD in the effluent of a chemical clarification unit to acceptable levels has been studied. The amount was found to depend principally on the initial TOD and to be a weaker function of other variables. The stoichiometric efficiency of ozone was increased by providing holding time between contactors. Treatment with eight ozone contact stages resulted in an effluent with a BOD5 of 16 mg/l. A comparative economic study was made of direct physicochemical treatment with activated carbon. The cost of the ozone process was 17% higher. However, credit was not allowed for the disinfection and aeration which occurred during ozonation. (Environment Canada)
W77-02747

PHOSPHORUS REMOVAL WITHIN EXISTING WASTEWATER TREATMENT FACILITIES,
Ontario Ministry of the Environment (Toronto)
B. I. Boyko, and J. W. G. Rupke.
Canada-Ontario Agreement on the Great Lakes Water Quality, Research Report No. 44, Environment Protection Service, Environment Canada, Ottawa, Canada, August 1976, 43p., 9 fig., 5 tab, 26 ref. 71-1-1.

Descriptors: *Phosphorus, *Water pollution control, *Treatment facilities, Waste water treatment, Coagulation, Costs, Effluents, Chemicals, Ponds, Anaerobic digestion, Sewage, *Canada.
Identifiers: *Phosphorus removal, *Ontario.

Various projects were undertaken to assist in the implementation of the Province of Ontario's phosphorus control program. Under this five-year program, phosphorus removal was to be initiated on the discharges of more than 170 existing wastewater treatment plants serving some five million persons. In order to implement this program, a methodology to predict the coagulant best suited for phosphorus removal at any particular treatment facility was required. It was also necessary to determine whether the chemicals used for phosphorus removal would have any physical or process effects on present wastewater treatment processes, facilities, methods of sludge treatment, and subsequent sludge disposal practices. This report discusses coagulation and prime coagulant selection, and the operational results problems and design considerations derived from a series of full scale studies. The study concluded that phosphorus removal may be readily implemented with minimal capital expenditure at operating municipal wastewater treatment facilities of a designs currently in use in Ontario. (Environment Canada)
W77-02748

ANAEROBIC DIGESTION OF LIME SEWAGE SLUDGE,
Ontario Ministry of the Environment, Toronto
Pollution Control Branch.
S. A. Black.
Canada-Ontario Agreement on the Great Lakes Water Quality, Research Report No 50, Environmental Protection Service, Environment Canada, Ottawa, Canada, 1976. 17 p, 1 fig, 1 tab, appendix 71-1-18.

Descriptors: *Sludge, *Anaerobic digestion, *Lime, Sewage treatment, Treatment facilities, Phosphorus, Disposal, Land, Municipal wastes, Gases, Waste treatment, Canada.
Identifiers: Newmarket, Ontario.

This study, designed to assess the ability of the anaerobic digestion process to accept the sludge produced by the addition of hydrated lime to the raw sewage of a conventional activated sludge plant, was supported under the Canada-Ontario Agreement on Great Lakes Quality. The study was carried out in conjunction with full-scale phosphorus removal at the Newmarket 2.0 MIGD activated sludge plant. An intensive sampling program on the two-stage anaerobic digester carried out between March, 1972 and March, 1973 is described. The study determined that normal digester operation when receiving lime sewage sludge may be anticipated, but that care should be used to eliminate shock loading effects when starting up a digester on lime sewage sludge. (Environment Canada)
W77-02750

EFFLUENT POLISHING BY FILTRATION THROUGH ACTIVATED ALUMINA, VOLUME II, (MARCH, 1975).
Pollutech Pollution Advisory Services Ltd., Orville (Ontario).
Canada-Ontario Agreement on the Great Lakes Water Quality, Research Report No. 40, Environmental Protection Service, Environment Canada, Ottawa, Canada, April, 1976, 110p. 10 tab, 12 fig, append. 73-5-4.

Descriptors: *Effluents, *Filtration, Water pollution control, Phosphorus, Lime, *Waste water treatment, Sewage, Costs, Municipal wastes, Canada, Treatment facilities.
Identifiers: *Effluent polishing, *Activated alumina columns, Waterloo, Ontario, Sodium hydroxide.

Chemically pretreated secondary effluent from the Waterloo Water Pollution Control Plant was polished in pilot scale activated alumina columns. Various regeneration modes for removal of phosphorus from the saturated alumina were investigated. The feasibility of lime treatment of the regenerant solutions to allow continued reuse of the caustic was evaluated. Capital and operating cost estimates were developed based on the findings of the study. All phases of the process, phosphorus adsorption, sodium hydroxide regeneration and lime precipitation were found to be technically feasible. The adsorptive capacity of fresh activated alumina was approximately 4 mg P/g Al203, but was significantly reduced after several saturation-regeneration cycles. One through elution with 15 bed volumes of 1N NaOH was the most efficient regeneration mode. Continuous recirculation of small volumes of caustic did not improve the regeneration efficiency. Activated alumina losses during regeneration were minimal and did not account for the loss of adsor

ive capacity of the bed. Lime treatment of the egenerant solutions at a dosage of 8 g/l effectively removed the phosphorus to allow reuse of the odium hydroxide solution. However, continued me addition adversely affected the settling properties of the precipitate and further studies are equired in this area. (See also W76-10491) Environment Canada)
W77-02755

AND DISPOSAL OF SEWAGE SLUDGE, OLUME III, APRIL 1974 - MARCH, 1975,
Guelph Univ. (Ontario). Dept. of Microbiology; nd Guelph Univ. (Ontario). Dept. of Land Resources Science.
Canada-Ontario Agreement on the Great Lakes Water Quality, Research Report No. 35, Environmental Protection Service, Environment Canada, Ottawa, Canada, February 1976, 282p., 11 fig., 226 ab. 72-5-17.

Descriptors: *Sewage sludge, *Sewage treatment, Land use, Hazards, Rates of application, Soils, Runoff, Heavy metals, Microbiology, Seasonal, Seepage, Phosphorus, Crop response, *Waste isposal, *Sewage disposal, Water reuse, Recycling.
dentifiers: *Land disposal, Soil characterization.

Described are runoff studies with fall, winter and pring applied sewage sludge, and field rate and ource of sludge studies with bromegrass on a oam soil and with corn on a loam, a sandy loam nd a clay loam soil. A greenhouse trial with different rates and sources of sludge on two soils at hree pH levels is also reported. Fluid digested ewage sludges from calcium oxide treatment of Newmarket sewage, aluminum sulphate treatment f Kitchener sewage and ferric chloride treatment f North Toronto sewage were used. Chemical nalyses of the sludge, soil nitrogen, crop yields nd nutrient and metal content of crops are resented along with microbial studies of the ludge and the crops grown. detailed descriptions f the soils used are also presented. In runoff studies, losses of nitrogen and nutrients were low in 974, lower than 1973. In the field, crops esponded to sewage, responses being similar in ost cases to those from chemical fertilizers. About twice as much nitrogen was required from ludges as from ammonium nitrate to produce a articular yield. At higher rates of sludge applicaion, levels of nitrate toxic to animals were approached. Sludges increased sodium bicarbonate oluble ('plant available') phosphorus quite markedly, and this effect was greatest with calcium ludge. Cadmium, nickel and zinc concentrations n crops increased appreciably with additions of ludge high in metals. (Environment Canada)
W77-02756

PILOT SCALE EVALUATION OF A PHYSICAL-CHEMICAL WASTEWATER TREATMENT SYSTEM FOR COMBINED SEWER OVERFLOWS.
Pollutech Pollution Advisory Services Ltd., Oakville (Ontario).
Canada-Ontario Agreement on the Great Lakes Water Quality, Research Report No. 36, Environmental Protection Service, Environment Canada, Ottawa, Canada, 1976, 96 p, 27 fig, 29 tab, 19 ref. 4-8-29.

Descriptors: *Waste water treatment, *Sewers, Overflow, Storm water, Suspended solids, *Pilot plants, *Screens, Gravity, Separation techniques, Filters, Chemicals, Ozone, *Combined sewers, Treatment facilities.
dentifiers: Oakville, Ontario, Strainers, Microstrainer(R), *Ozonation.

A pilot scale investigation of the feasibility of using coarse screening, microscreening, and ozonation for the treatment of combined sewer overflows is described. The pilot scale system consisted of a Crane-Cochrane Microstrainer with 23 micron screen openings and an ozone generator. The dilute waste concentrations anticipated in combined sewer overflows were simulated by diluting raw sewage with tapwater. The contaminants measured were BOD, total organic carbon, suspended solids, total phosphorus, oil and grease, and total coliforms. The effects of waste strength and hydraulic loading were studied by varying the dilution of the raw waste and controlling the throughput of the unit. The contaminant removal efficiency decreased with the degree of dilution of the raw sewage, and the hydraulic loading on the Microstrainer increased. The effect of ferric chloride and polyelectrolyte chemical addition prior to microscreening was investigated, but no beneficial effect on the treatment efficiency was observed. Ozonation reduced the concentration of all measured contaminants including suspended solids. At a 20 mg/l ozone dosage in a continuous ozonation reactor with a nominal 15 minute retention time, COD removals of 40 to 50 percent were observed. Microscreened raw sewage spiked with lead to simulate street runoff showed a 35 percent reduction in lead concentration. The average removal efficiency of the pilot scale treatment system for all experimental conditions was 67% BOD5 removal, 40d% suspended solids removal, 26% total phosphorus removal, and greater than 99.9% total coliform reduction. (Environment Canada)
W77-02757

REVIEW OF ENVIRONMENTAL CONTROL OF MERCURY IN JAPAN,
Environmental Protection Service, Ottawa (Ontario).
For primary bibliographic entry see Field 5G.
W77-02761

MODIFICATION OF THE TRADITIONAL SEQUENCE FOR THE TREATMENT OF WASTEWATERS FROM METAL FINISHING INSTALLATIONS,
Environmental Protection Service, Ottawa (Ontario).
L. Buffa.
(Water Pollution Control Directorate) Economic and Technical Review Report, July 1976, 12p., 3 fig, append.

Descriptors: *Waste water treatment, *Metals, *Heavy metals, Separation techniques, Effluents, Regulation, Chemical precipitation.
Identifiers: *Metal finishing plants, *Cyanides, Precipitation(Treatment), Clarification, Chemical treatment.

This analysis was initiated as an attempt to define the effect a controlled amount of dilution water would have on the amount of contaminats discharged from metal finishing operations and their concentrations. A simplified 'traditional' chemical treatment system has been used as a model to arrive at a relationship between quantity and concentration of a given contaminant, and the ratio volume of treated process water to volume of dilution water. This relationship has been used to discuss a modified treatment system applicable to wastewater from metal finishing installations. (Environment Canada)
W77-02762

REMOVAL AND RECOVERY OF METALS FROM SLUDGE AND SLUDGE INCINERATOR ASH,
Canada Centre for Inland Waters, Burlington (Ontario).
B. G. Oliver, and J. H. Carey.
Canada-Ontario Agreement on the Great Lakes Water Quality, Research Report No. 33, Environmental Protection Service, February 1976, 58p., 16 fig., 22 tab, 31 ref. 74-3-15

Descriptors: *Sludge treatment, *Heavy metals, Copper, Zinc, Nickel, Cadmium, Trace elements, Temperature, Costs, Sludge digestion, Phosphates, Aqueous solutions, Electrodes, Electrochemistry, *Waste water treatment, Recycling.
Identifiers: *Sludge incinerator ash, Sulphuric acid, Copper struck graphite and aluminum electrodes, *Metal recovery, *Metals removal.

The electrochemical plating of Cu, Zn, Ni and Cd from aqueous solutions has been studied using standard plate type electrodes and improved efficiencies were attained with fluidized bed electrodes. Because direct electroplating from sludge was inefficient, acid and base additions were made to solubilize the metals prior to plating. Most of the metals and phosphorus in the digested sludge could be dissolved by adding sufficient H2SO4 or HC1 to lower the sludge pH to 1.5. The average cost of acid required per ton of dry solids was $41 for the H2SO4 and $77 for HC1. Little economic advantage would be gained by recovering sludge constituents, since processing costs for the large volumes of dilute leachate would be high. The metals and phosphorus in sludge incinerator ash can be solubilized with H2SO4 in a countercurrent stepwise process which uses most of the acid. Further processing of the H2SO4 leachate for recovery of valuable constituents is complicated by the presence of large quantities of iron in the leachate. Neutralization of the leachate with NaOH precipitates all the metals and phosphorus. Treating this precipitate with a hot NH4OH - (NH4) 2SO4 mixture resolubilizes most of the trace metals and phosphorus leaving iron oxide in the solid phase. Electroplating can remove Cu, Zn, Ni and Cd from the ammonia leach, and ammonium phosphate can be recovered from the solution after electrolysis. While processing costs for incinerator ash are much less than those for wet sludge, the procedure does not appear to be economically viable except for very large treatment plants. (Environment Canada)
W77-02763

PRACTICES, POLICIES AND TECHNOLOGY OF STORM AND COMBINED SEWERS IN FOREIGN COUNTRIES.
Albery, Pullerits, Dickenson and Associates Ltd., Don Mills (Ontario).
For primary bibliographic entry see Field 5G.
W77-02767

POLYCHLORINATED BIPHENYLS (PCB'S) IN MUNICIPAL WASTEWATERS: AN ASSESSMENT OF THE PROBLEM IN THE CANADIAN LOWER GREAT LAKES,
Environmental Protection Service, Burlington (Ontario). Waste Water Technology Centre.
For primary bibliographic entry see Field 5A.
W77-02768

CHROMIUM RECOVERY FROM SLUDGES PRODUCED FROM CHROMATE-INHIBITED COOLING WATER,
Goodyear Atomic Corp., Piketon, Ohio, Process Technology Dept.
L. E. Deacon, M. E. Holland, and R. I. Kaplan.
(1975). 16 p, 4 tab, 4 fig, 6 ref.

Descriptors: *Waste water treatment, *Cooling water, *Chromium, Chemical wastes, Water pollution sources, Water chemistry, Separation technique.
Identifiers: *Calcination.

The technical feasibility of recovering chromium values from sludge produced when recirculating cooling water is treated to remove toxic hexavalent chromium before discharge is demonstrated. The most successful approach involved calcination of the sludge with added soda ash at 850-900C for about 30 minutes in an open-air calciner. 75% recovery yields were recorded. The process converts the chromium to water-leachable sodium chromate. (Chilton-ORNL)
W77-02874

SILICA IN WATER IN RELATION TO COOLING TOWER OPERATION,
Los Alamos Scientific Lab., N. Mex.
C. Wohlberg, and J. R. Buchholz.
Report LA-UR-74-1895, 56 p, 17 fig, 51 ref, append. International Corrosion Forum Devoted Exclusively to the Protection and Performance of Materials, Toronto, Ontario, Canada, April 14-18, 1975. W-7405-Eng-36.

Descriptors: *Water purification, *Cooling water, *Cooling towers, *Silica, Chemistry, Separation techniques, Water pollution, Heat transfer, *Waste water treatment.

Evaporation of cooling tower water concentrates the initial silica content of the water and causes it to precipitate on heat-exchanger surfaces, thus interfering with heat transfer. It was concluded that the solubility of silica is a function of the species with which it is in equilibrium. The data cited indicate that magnesium and aluminum ions play a large role in natural systems in removing silica from water. These ions probably also have a large role in the deposition of silica in heat exchangers and have been the basis for some commercial methods of SiO2 removal from water. (Chilton-ORNL)
W77-02875

CHEMICAL COMPOSITION AND METHODS FOR PURIFYING PHENOLIC WASTE WATERS RESULTING FROM RAPID THERMOLYSIS OF LIGNITES OF THE IRSHA-BORODINO AND MOSCOW REGIONS,
Kaliniskii Politekhnicheskii Institut (USSR).
L. I. Volkova, A. M. Kunin, N. N. Amagaeva, G. V. Nenast'eva, and A. Y. Tkachenko.
ORNL-tr-2944, p 20-25, 1 tab, 5 ref. Translated from Trudy Kalininskogo Politekhnicheskogo Instututa, Moscow, Vol 13, 1972.

Descriptors: *Water pollution, Waste water(Pollution), Water quality, Chemical wastes, *Phenols, Chemistry, Coals, Lignite, *Water purification, *Waste water treatment, Industrial wastes.

The paper reports on the possibility of dephenolizing waste waters from the rapid thermolysis process by an extraction method as follows: the tar water solution, after preliminary filtration and neutralization, is extracted with butyl acetate with a total solvent consumption of 20% of the water volume, at 20-22C and with a standing time of 60 min. Data showed that water from the non-pyrolysis regime has an extraction coefficient for total phenols of 64-73%, for nonvolatiles of 49.5-63.2% and for volatiles of 94.9-96.5%. In the extraction of phenolic waters obtained in the process with additional pyrolysis, there is a higher extraction coefficient for total phenols(87-90%) but near the same extraction coefficient for volatiles and nonvolatiles. It was concluded that tar water obtained in rapid thermolysis decomposition of tar water and Irsha-Borodino brown coals have a complex chemical composition and are difficult to purify. (Chilton-ORNL)
W77-02993

MEASURES TO COUNTERACT DAILY WATER POLLUTION: DEVELOPMENT TENDENCIES IN USA, (IN SWEDISH),
Swedish Council for Building Research, Stockholm.
G. Svensson.
Vatten 31(3), p 198-212, 1975.

Descriptors: *Sewage disposal, *Sewage treatment, *Sewerage, *Mathematical models, *Cost analysis, *Urban runoff, *Combined sewers, Planning, Runoff, Waste storage, Rainfall-runoff relationships, Separated sewers, Biodegradation, Chemical degradation, *United States.
Identifiers: Sweden, Denver, Chicago, Washington(D.C.).

USA work on sewage disposal problems is reviewed to determine the best and cheapest solution applicable in Sweden, particularly with the problems of overloading caused by severe rainfall. Whether a combined sewage system or the most costly separate sanitary sewers should be used is discussed. Experience in Denver, Colorado, Chicago, Illinois and Washington, D. C. is described. Mathematical models and cost estimates for different schemes in other cities are presented. Emergency plans for Washington involve systems combining biological and chemical purification of sewage capable of dealing with large volumes of dirty runoff water. A combined sewage system including an overflow storage space can cope with most Swedish problems with cost savings provided there is a combined network of sewage mains.
W77-03035

RECOVERY OF POLLUTED LAKES; A SWEDISH RESEARCH PROGRAM ON THE EFFECTS OF ADVANCED WASTEWATER TREATMENT AND SEWAGE DIVERSION: 7. DIFFUSE MUNICIPAL POLLUTION: EXAMPLES FROM THE TOWNS OF MOTALA AND UPPSALA, (IN SWEDISH),
Uppsala Kommun Naturvardsverkets RR-Undersokning (Sweden). Algtestlab. Fysiol. Bot.
P. Wenster, S. O. Ryding, and C. Forsberg.
Vatten 31(3), p 274-285, 1975.

Descriptors: *Water pollution, *Waste water treatment, *Sewage treatment, *Sewage effluents, *Nutrient removal, *Urban runoff, Lakes, Water pollution treatment, Phosphorus, Storm water, Waste water(Pollution), Water pollution sources.
Identifiers: Diversoni, Motala, Lake, Recovery, Sweden, Uppsala, Polluted Lakes.

The building of advanced wastewater treatment plants resulted in a lower P content in sewage effluent. In addition to the pollution from the treatment plants, diffuse municipal loading (urban storm water and wastewater) adds nutrients to the wastewater receiving waters. When studying the recovery of polluted lakes, it is essential to quantify the total transport of nutrients. The quality of urban storm water from areas of different structure and the yearly amount of pollution originating from diffuse sources in Motala and Uppsala (Sweden) were studied. Great amounts of diffuse pollution in relation to sewage effluents were found. For an optimal water-control program effort should be made to minimize diffuse pollution sources.
W77-03057

5E. Ultimate Disposal Of Wastes

INCINERATION OF INDUSTRIAL WASTES,
Minnesota Mining and Mfg. Co., St. Paul.
C. R. Lewis, R. E. Edwards, and M. A. Santoro.
Chemical Engineering/Deskbook Issue, Vol. 83, No. 22, p 115-121, October 18, 1976. 2 fig.

Descriptors: *Chemical industry, *Incineration, *Air pollution, *Waste water treatment, *Treatment facilities, Chemical wastes, Industrial wastes, Neutralization, Chemical reactions, Sedimentation, Heat transfer.
Identifiers: Wet scrubbing.

An incineration facility for destroying toxic chemical wastes is described. The heart of the system is a 23,000-kilocalorie/hr rotary kiln incinerator which is used for the disposal of solvent-contaminated wastes. The purpose of incineration is to produce stable oxides that can be returned to the environment without causing detrimental effects. Satisfactory combustion in the primary and secondary chambers of the incinerator is the key to air pollution control; however, the incinerator is also outfitted with a wet scrubber system. The scrubber system consists of five major components: a quench chamber, a venturi scrubber, a mist separator, an induced-draft fan, and a 200-foot stack which acts like a reflux condenser. The scrubber effluent is subject to acid neutralization, chemical treatment, and sedimentation before it is discharged to the receiving stream. Pilot studies involving attempts to recover heat from the incinerator in the form of steam indicate that such recovery is not economically attractive because of the sizable distribution system required. (Kreager-FIRL)
W77-02596

SYNCRUDE VOWS ENVIRONMENTAL RESPONSIBILITY,
Syncrude Canada Ltd., Edmonton (Alberta).
For primary bibliographic entry see Field 5D.
W77-02600

HANDLING DISCHARGES FROM WASTE OIL PROCESSING,
Recon Systems, Inc., Princeton, N.J.
For primary bibliographic entry see Field 5D.
W77-02604

SUMMARY OF GROUND-WATER QUALITY IMPACTS OF URANIUM MINING AND MILLING IN THE GRANTS MINERAL BELT, NEW MEXICO,
Office of Radiation Programs, Las Vegas, Nev.
For primary bibliographic entry see Field 5B.
W77-02648

HISTORY OF OCEAN DUMPING IN THE GULF OF MEXICO,
Texas A and M Univ., College Station. Dept. of Civil Engineering
R. W. Hann, Jr., T. F. Zapatka, M. C. Zapatka, and C. Baskin
Sea Grant Program Report No. TAMU-SG-77-201, October 1976. 96 p, 12 fig, 5 tab, 31 ref. SG 04-6-158-44012

Descriptors: *Gulf of Mexico, *Waste disposal, *Permits, Sewage disposal, Sludge disposal, Public rights, Oceanography, History.
Identifiers: *Ocean dumping, *Public Law.

A historical look at the practice of ocean dumping in the Gulf of Mexico is presented. The past and present ocean disposal practice in the Gulf of Mexico is documented. The Gulf of Mexico is defined with respect to physical, chemical, and biological characteristics. The currents, temperatures, and salinities are reported as well as a list of major river systems that drain into the Gulf. The economic importance with respect to fisheries and oil and gas reserves is discussed. The report is divided into tow sections: the Corps of Engineers permitting system, and the EPA permitting system. Some information is included on who is known to have been dumping and what they have dumped, and when the dumping took place. Under the EPA permitting system, there is much more information concerning dumping. Excerpts from the Marine Protection, Research and Sanctuaries Act of 1973, which defines the national policy toward ocean dumping, are given as well as the types of permits issued under this law. Actual permits issued by the EPA were obtained from the regional office in Dallas, Texas and reviewed. A summary of each permit was made and presented. A short section discussed the more commonly used methods of discharging wastes from vessels such as jet-dispersion, hopper-barge, wake mixing, and container discharge. (NOAA)
W77-02668

ABSTRACTS. SPECIAL SYNPOSIUM - THE MIDDLE ATLANTIC CONTINENTAL SHELF AND NEW YORK BIGHT,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
For primary bibliographic entry see Field 5C.

/77-02678

FFECTS OF BALED SOLID WASTE ISPOSAL IN THE MARINE ENVIRONMENT-- DESCRIPTIVE MODEL,
ew Hampshire Univ., Durham. Dept. of Earth ciences.
or primary bibliographic entry see Field 5B.
/77-02683

OMPUTER-AIDED PLANNING OF RE-IONAL SLUDGE DISPOSAL SYSTEMS, SER'S MANUAL,
and P Engineers, Kitchener (Ontario).
or primary bibliographic entry see Field 5D.
/77-02745

AND DISPOSAL OF SEWAGE SLUDGE, OLUME III, APRIL 1974 - MARCH, 1975,
uelph Univ. (Ontario). Dept. of Microbiology; id Guelph Univ. (Ontario). Dept. of Land esources Science.
or primary bibliographic entry see Field 5D.
/77-02756

ONTROLLED COMBUSTION TESTS CAR-IED OUT NEAR RIMOUSKI,
nerbrooke Univ. (Quebec). Dept. of Chemical ngineering.
. Coupal.
echnology Development Report EPS-4-EC-76-2, nvironmental Protection Service, Ottawa, anada, March 1976, 15p., 4 fig., 2 tab.

escriptors: *Oil spills, *St. Lawrence River, esting, Tides, Ice, Burning, Efficiencies, Waste sposal, Oil wastes, Oil pollution, Water pollution ntrol.
lentifiers: *Combustion, Crude oil, Bunker C oil.

ix combustion tests were performed on oil. Ceuta ude oil and Bunker C Oil were burned both on ater and on ice. The burning of these oils was ef-cted by using peat moss as a wicking agent and esel fuel as a promoter. Combustion efficiencies the order of 85 percent were attained. This mbustion technique is a feasible method of sposing of oil spills. Recommendations are made r future research. (Environment Canada)
/77-02759

ONTAMINANTS IN THE NEW YORK BIGHT,
anhattan Coll., Bronx, N.Y. Environmental En-neering and Science Program.
or primary bibliographic entry see Field 5B.
/77-02799

EASURES TO COUNTERACT DAILY WATER OLLUTION: DEVELOPMENT TENDENCIES USA, (IN SWEDISH),
vedish Council for Building Research, ockholm.
or primary bibliographic entry see Field 5D.
/77-03035

F. Water Treatment and Quality Alteration

ONTROL AND MONITOR INSTRUMENTA-ON FOR MUST WATER PROCESSING ELE-ENT, FINAL REPORT,
fe Systems, Inc., Cleveland, Ohio.
or primary bibliographic entry see Field 5A.
/77-02878

XPERIMENTAL, CLINICAL AND HYSIOLOGICAL DATA FOR SUBSTANTIAT-G THE LOWER LIMITS OF THE MINERALIZATION OF DESALINATED DRINKING WATER, (IN RUSSIAN),
Moskovskii Gosudarstvennyi Meditsinskii Institut (I).(USSR). Dept. of Public Hygiene.
For primary bibliographic entry see Field 5C.
W77-02895

DRINKING WATER SUPPLY IN KRASNOVODSK, (IN RUSSIAN),
Krasnovodsk Heat and Power Plant (USSR).
For primary bibliographic entry see Field 3A.
W77-02902

PHYSIOLOGICAL ASSESSMENT OF CALCIUM CONTENT IN DISTILLED DRINKING WATER, (IN RUSSIAN),
A. I. Bokina, V. K. Fadeeva, and E. M. Vikhrova.
Gig Sanit 11, p 14-17, 1975.

Descriptors: *Calcium, Rodents, *Desalination, Public health, *Potable water, Water treatment.
Identifiers: *Hypocalcemia.

The investigations were carried out on an experimental model of relative hypocalcemia in rats (on a Ca-rich diet). The hypocalcemia was compensated by water with a different Ca content at a level of 0.25, 50, 75, 100, 125 and 150 mg/l. The most adequate Ca content in desalinated drinking water was a level of 50-75 mg/l.--Copyright 1976, Biological Abstracts, Inc.
W77-02909

STUDY OF THE EFFECT OF DESALTED DRINKING WATER ON THE HEALTH OF THE POPULATION, (IN RUSSIAN),
Moskovskii Gosudarstvennyi Meditsinskii Institut (I) (USSR). Dept. of Public Hygiene.
A. I. Bokina, Yu. A. Rakhmanin, and V. P. Plugin.
Vestn Akad Med Nauk Sssr 3, p 41-46, 1975.

Descriptors: *Potable water, *Desalination, *Public health, *Investigations, Desalination plants, Water quality, Standards, Hardness(Water), Sulfates, Taste, *Water treatment.
Identifiers: Encephalogram, Kazakh-Ssr, Mineralization, Shevchenko, USSR, Caspian Sea.

The results are presented of clinical and physiological investigations of the population of the city of Shevchenko, a port city on the Capsian Sea in the Kazakh SSR (USSR), were desalted water has been used for drinking since 1968. The investigation is continuing, but for the present the following recommendations are given for large desalination plants: lower limit of mineralization, not less than 100 mg/1; permissible level of sulfates in the desalted water, not more than 250 mg/1; optimal level of mineralization on the basis of an EEG study of taste reactions, from 200-600 mg/1.
W77-03037

FLUORINE IN DRINKING WATER OF EASTERN SLOVAKIA, (IN RUSSIAN),
Univerzita Pavala Jozefa Safarika, Kosice (Czechoslovakia). Faculty of Medicine.
For primary bibliographic entry see Field 5A.
W77-03056

5G. Water Quality Control

ENVIRONMENTAL OUTLOOK: WHERE WE STAND, WHAT'S AHEAD,
G. W. Johnston.
Pulp and Paper, Vol 60, No 10, p 78-81, September, 1976.

Descriptors: *Water pollution control, *Air pollution, *Pulp and paper industry, Federal Water Pollution Control Act, Legislation, Odor, Pulp wastes.
Identifiers: Kraft mills, Closed systems.

In this interview, the status of the paper industry's pollution-control efforts and possible future developments are discussed via question and answer responses of Peter Wrist, vice president at Mead Carney International Company. Specifically, implications of the 1977 and 1983 goals of the Federal Water Pollution Control Act amendments are considered, together with the feasibility of completely closing the kraft pulp and paper processes and long-term solutions to the odor problems. (Sykes-IPC)
W77-02580

WASTEWATER REQUIREMENTS MULTIPLY SOLIDS PROBLEMS,
Texas Univ. at Dallas, Richardson.
J. G. Moore, Jr.
Hydrocarbon Processing, Vol. 55, No. 10, p 98-101, October, 1976. 4 fig, 2 tab, 5 ref.

Descriptors: *Oil industry, *Waste water treatment, *Solid wastes, *Waste disposal, *Economics, Sludge disposal, Industrial wastes, Incineration, Landfills, Farms, Regulation, Legal aspects.

The effect of increasingly stringent waste water requirements on solids disposal problems is discussed, with particular emphasis on the oil refining industry. The total sludge production for industry resulting from waste water treatment is expected to rise from 23.36 million tons/yr (dry) for the year 1971 to an estimated 47.27 million tons/yr by 1983. Three viable alternatives are available for the disposal of oily sludges and solids: sanitary landfill, land farming, and incineration with landfill of the resultant inert ash. Landfill is the most common and most economical technique currently used by refineries for solids disposal when transport distance is relatively short. However, increasing difficulty with securing adequate landfill sites within economic range and meeting regulatory requirements for landfills may enhance the attractiveness of land farming and incineration. Land farming requires adequate inexpensive land within reasonable transport distance to be economically feasible. Incineration has the advantages of elimination of most odors, operation independent of weather conditions, and substantial reductions in volume and weight of solids. However, its disadvantages include high initial capital investment, high operation costs for minimal volumes of solids, and supplemental fuel needs. (Kreager-FIRL)
W77-02601

QUEBEC ENVIRONMENTAL REGULATIONS IN THE TEXTILE INDUSTRY...AND ONE COMPANY'S SOLUTION,
C. Planzer.
Canadian Textile Journal Vol 93, No 10, p 79, 82, 84, 16, 88, October, 1976. 2 fig, 3 tab.

Descriptors: *Chemical wastes, *Textiles, *Waste water treatment, *Activated sludge, *Industrial wastes, Biological treatment, Biochemical oxygen demand, Efficiencies, Performance, sludge, Economics, Legal aspects, Pollution abatement, *Canada.
Identifiers: Latex waste, *Quebec, Textile industry.

Quebec's regulations regarding industrial water pollution and their impact on the textile industry are reviewed along with the installation of an activated sludge treatment plant at one textile manufacturing facility. As of October 8, 1975, a liquid waste management regulation which prohibits the discharge, deposit, or dumping of liquid waste into the environment has been in force. Textile plants that were disposing latex waste at a local dump are now required to dispose of these wastes in approved liquid waste management plants or to obtain a permit if they wish to dispose of it themselves. One plant's answer to the new regulation was the installation of an activated sludge treat-

ment plant. Biolcgical oxygen demand reductions in excess of 95% have been achieved thus far, although the system has been plagued by periodic upsets characterized by rising sludge in the clarifiers. Studies are underway to isolate the specific causes of this behavior. The total cost of the waste treatment facility including engineering and ultimate sludge disposal is expected to be about $4 million. (Kreager-FIRL)
W77-02611

MUNICIPAL WASTEWATER RECYCLING: A STRATEGY FOR MEETING THE ZERO DISCHARGE GOAL OF PL 92-500,
California Univ., Los Angeles. School of Architecture and Urban Planning.
For primary bibliographic entry see Field 5D.
W77-02620

COMPARATIVE METHYLATION CHEMISTRY OF PLATINUM, PALLADIUM, LEAD, AND MANGANESE,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 5A.
W77-02623

PESTICIDE RESIDUE ANALYSIS IN WATER (103.1), TRAINING MANUAL,
Environmental Protection Agency, Cincinnati, Ohio. Office of Water Program Operations.
For primary bibliographic entry see Field 5A.
W77-02624

THE MARINE BIOLOGICAL IMPACT OF THE HONOLULU GENERATING STATION,
Hawaii Univ., Honolulu. Sea Grant Program.
For primary bibliographic entry see Field 5C.
W77-02631

ANALYSIS AND CONTROL OF THERMAL POLLUTION (178) TRAINING MANUAL,
Environmental Protection Agency, Cincinnati, Ohio. Office of Water Programs Operations.
For primary bibliographic entry see Field 5B.
W77-02632

COMPILATION OF STATE DATA FOR EIGHT SELECTED TOXIC SUBSTANCES, VOL. V, MONITORING PROGRAM CAPABILITY, DESCRIPTOR TABLES,
Mitre Corp., McLean, Va.
E. Roberts, R. Spewack, S. Stryker, and S. Tracey.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-248 664, Price codes: A14 in paper copy, A01 in microfiche. Report EPA 560/7-75-001-5, September 1975, 327 p., 1 tab., 1 fig.

Descriptors: *Beryllium, *Cadmium, *Chromium, *Lead, *Mercury, *Polychlorinated biphenyls, *Arsenic compounds, *Monitoring, *Data collection, *Public health statistics, Statistical methods.
Identifiers: *Arsenic, *Cyanide, Monitoring capability, *Toxic substances.

This volume comprises 160 charts which summarize state agency toxic substances monitoring capabilities by state, substance and agency for 25 monitoring program descriptors. Substances monitored are arsenic, beryllium, cadmium, chromium, cyanide, lead, mercury, PCB's, and other substances. (See also W77-02642; W77-02204 and W77-02205) (Katz)
W77-02641

COMPILATION OF STATE DATA FOR EIGHT SELECTED TOXIC SUBSTANCES. VOLUME II, DIRECTORY OF STATE TOXIC SUBSTANCES MONITORING AGENCIES,
Mitre Corp., McLean, Va.
E. Roberts.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-248 661, Price codes: A05 in paper copy, A01 in microfiche. Report EPA-560/7-75-001-2, September 1975, 25 p.

Descriptors: *Monitoring, *State governments, Public health, *Basic data collections, Data transmission, Documentation, Metals, Polychlorinated biphenyls, Administrative agencies, State jurisdiction.
Identifiers: *State agency contacts, *State agencies, *Agency directors.

In June 1974 the Office of Toxic Substances, EPA, contacted with MITRE to collect and analyze toxic substances data in the U.S. In the next 14 months MITRE contacted agencies in 20 key states and collected and analyzed their monitoring data. This appendix is a listing of key points-of-contact, phone numbers, agencies, and addresses, for each agency in the 20 states contacted which monitored toxic substances. (See also W77-02641; W77-02204 and W77-02205) (Katz)
W77-02642

PROCEEDINGS OF: NATIONAL CONFERENCE ON HEALTH, ENVIRONMENTAL EFFECTS, AND CONTROL TECHNOLOGY OF ENERGY USE.
Environmental Protection Agency, Washington, D. C. Office of Energy, Minerals and Industry
Available from the National Technical Information Service, Springfield, VA 22161 as PB-256 845, Price codes: A15 in paper copy, A01 in microfiche. Held in Washington, D.C., February 9-11, 1976. Report 600/7-76-002, 340 p.

Descriptors: *Path of pollution, Water pollution, *Water quality, *Water pollution sources, Heated water, Heavy metals, Environmental effects, Marine animals, Air, Air environment, Air pollution, Air pollution effects, Monitoring, Data collection, Terrestrial habitats, Fuels, *Energy, Energy conversion, Public health.
Identifiers: Environmental health effects, Marine ecological effects, Freshwater ecological effects, Terrestrial ecological effects, *Energy resource extraction, Fuel processing, Flue gas technology, Energy conservation.

Proceedings of a National conference on the health, environmental effects and control technology of Energy use. Subjects covered were atmospheric transport of energy related pollutants, measuring and monitoring of air and water pollution, marine ecological effects, fresh water ecological effects, terrestrial ecological effects, energy resource extraction, fuel processing, flue gas technology and energy conservation. (See also W77-02650 thru W77-02658) (Katz)
W77-02649

AN ENVIRONMENTAL OVERVIEW OF UNITED STATES ENERGY FUTURES,
Environmental Protection Agency, Washington, D. C.
S. J. Gage.
In: Proceedings of National Conference on Health, Environmental Effects, and Control Technology of Energy Use, Report 600/7-76-002, 1976. p 15-25, 15 fig.

Descriptors: Environmental effects, *Fuels, Fossil fuels, Coals, Natural gas, Oil, *Oil pollution, Oil shales, *Oil wastes, Oily water, Energy, Energy conversion, Heat, Solar radiation, *Geothermal studies, *Coal mine wastes, Water pollution sources, *Coal mines, Strip mine wastes, Water quality, Air pollution, Marine environment.
Identifiers: *Energy production, *Surface coal mining, *Fluidized bed combusion, *Oil shale development, Geothermal energy development.

A general discussion and prediction of the environmental impacts of energy production in the United States. Briefly treated are the impacts of petroleum production in the marine environment coal mining especially surface mining, coal utilization, including fluidized bed combustion, oil shale development, geothermal energy development and solar energy. (See also W77-02649) (Katz)
W77-02650

MONITORING WESTERN ENERGY RESOURCE DEVELOPMENTS,
Environmental Monitoring and Support Lab., Las Vegas, Nev.
R. K. Oser, S. C. Black, D. N. McNelis, S. H. Melfi, and G. B. Morgan.
In: Proceedings of National Conference on Health, Environmental Effects, and Control Technology of Energy Use, Report 600/7-76-002, 1976. p. 47-50.

Descriptors: *Monitoring, *Environmental effects, *Water pollution, *Oil shales, *Water supply, *Water pollution sources, *Strip mine wastes, *Oil shales, *Saline waters, Energy, Coal Mine wastes, Air pollution, Aquatic environment, Wyoming, Utah, Colorado, Methodology.
Identifiers: Green River formation, *Air monitoring, *Water quality data integration, Remote sensing, *Radiological pollutant monitoring, *Ground water monitoring, *Geothermal monitoring, Technique development.

It is the responsibility of the U. S. Environmental Protection Agency to develop and implement multi-media monitoring systems which can be used at the Federal, State, and local levels to help ensure that this development is in concert with the national commitment to maintain and improve environmental quality. The projects outlined in this paper describe the role of the Environmental Monitoring and Support Laboratory-Las Vegas, in helping to discharge this responsibility. (See also W77-02649) (Katz)
W77-02651

NOAA'S ACTIVITIES IN ENERGY RELATED MEASUREMENT AND MONITORING,
National Oceanic and Atmospheric Administration, Rockville, Md.
A. B. Bestul, and W. L. Pugh.
In: Proceedings of National Conference on Health, Environmental Effects, and Control Technology of Energy Use, 600/7-76-002, 1976. p. 51-54.

Descriptors: *Monitoring, *Environmental effects, *Water pollution, *Energy, *Water pollution sources, Aquatic environment, *Air pollution, Oil spills, *Methodology, *Transportation, Waves(Water), Sampling, Water sampling, Data collectors, Estimating, Forecasting, On-Site data collection, Statistical methods, Weather modification.
Identifiers: *Oil spill concentration, Oil spill, *Trajectory forecast, *Shipboard environment data acquisition, *Atmospheric investigation, Velocity structure.

This paper describes the activities of the National Oceanic and Atmospheric Administration (NOAA) in energy related measurement and monitoring under the Interagency Health and Ecological Effects Program of the Presidential Five-Year Energy R and D Plan. These activities are directed at developing and applying techniques and instrumentation for impact assessment measurement and continuing monitoring of environmental pollutants arising from existing and future energy related facilities. Four projects are devoted to oceanic investigations, and three to atmospheric investigations. (See also W77-02649) (Katz)
W77-02652

WATER MEASUREMENT AND MONITORING IN ENERGY DEVELOPING AREAS,
Geological Survey, Reston, Va.
F. A. Kilpatrick.

Proceedings of National Conference on
alth, Environmental Effects, and Control
hnology of Energy Use, Report 600/7-76-002,
6. p. 69-73, 2 tab.

scriptors: *Monitoring, *Environmental ef-
ts, *Water pollution, Energy, *Aquatic en-
nment, *Methodology, Sampling, Water sam-
g, *Data collections, Forecasts, *On-Site data
ections, Statistical methods, Instrumentation,
a collections, Path of pollutants, Biological
mmunities, Oil, Sediment, Suspended solids,
pended load, Groundwater.
ntifiers: Chronic toxicity, Sub-lethal concen-
ions, *Aquatic ecosystems, Chronic exposure,
oundwater monitoring.

U. S. Geological Survey operates a rather ex-
sive water quality, quantity, and sediment
nitoring network in the Rocky Mountains and
rthern Great Plains States where there now is
at interest in development of major fossil fuel
ources. With the sudden emphasis on investiga-
s in this region, the Survey, with assistance
n the U. S. Environmental Protection Agency
other agencies, began promptly to increase the
mber of monitoring stations and to upgrade ex-
ng stations. (See also W77-02649) (Katz)
7-02653

**RTICIPATION OF ERDA IN THE TRANS-
RT AND ECOLOGICAL EFFECTS CATEGO-
ES OF THE PASS-THROUGH PROGRAM,**
ergy Research and Development Administra-
, Washington, D. C.
E. Franklin, D. S. Ballantine, J. O. Blanton, D.
Hamilton, and C. M. White.
Proceedings of National Conference on
alth, Environmental Effects, and Control
hnology of Energy Use, Report 600/7-76-002,
6. p. 106-118, 2 tab, 2 fig.

scriptors: *Meteorology, Meteorological data,
onitoring, Measurements, Ecology, Limnolo-
Oceanography, *Social impact, *Geothermal
dies, Trace elements, Water quality, Sedi-
nts, *Sediment transport, *On-the-site in-
tigations, *Coal mines, *Coal mine wastes,
uatic environment, Metals, Chlorine.
ntifiers: *Pass-through program, Transport,
ological effects, Trace contamination.

DA has been funded to do environmental
earch. ERDA's projects have been in the trans-
t and ecological effects areas. Characteriza-
, measuring and monitoring areas were also
ded. The applied science projects include
earch in meteorology, terrestrial ecology, lim-
ogy, oceanography, social science and related
as. (See also W77-02649) (Katz)
7-02654

**E EFFECTS OF FRESHWATER
THDRAWALS ON FISH AND WILDLIFE
SOURCES,**
n and Wildlife Service, Washington, D. C.
stern Water Allocation.
P. Hayden.
Proceedings of National Conference on
alth, Environmental Effects, and Control
hnology of Energy Use, Report 600/7-76-002,
6. p. 123-125, 1 tab.

scriptors: *Water quality, Water properties,
ater resources, Water sources, Aquatic en-
nment, Terrestrial habitats, *Fish, *Wildlife,
vironment, *Energy, Planning, Methodology,
nitoring.

Fish and Wildlife Service is identifying,
luating, and attempting to solve energy related
blems which threaten the water quality and
ntity essential for maintenance of viable
atic and terrestrial habitats. (See also W77-
49) (Katz)
7-02655

USDA RESEARCH AND DEVELOPMENT ON EFFECTS OF ENERGY PRODUCTION AND USE OF FRESHWATER RESOURCES,
Forest Service (USDA), Washington, D.C.
H. E. Brown.
In: Proceedings of National Conference on Health, Environmental Effects, and Control Technology of Energy Use, Report 600/7-76-002, 1976. p. 126-130, 1 tab., 10 ref.

Descriptors: *Water quality, *Water resources, Water sources, Aquatic environment, *Terrestrial habitat, Fish, Wildlife, Environment, Energy, Planning, *Agriculture, *Agricultural runoff, *Forest watershed, *Forests, Water pollution, *Fuels, *Energy, Forest management, Baseline studies.
Identifiers: *Energy conservation, Fuel extraction.

Because agriculture is one of the biggest users of water in the United States, it is vitally concerned with the increasing impacts that energy-related activities are having on the Nation's water resources. U.S. Department of Agriculture agencies conducting programs directly concerned with management of agricultural and forest lands must bear responsibility for maintaining the quality and availability of water resources in the face of these impacts. Of particular concern are pollutants resulting from fuel extraction and diversion of water from agricultural to energy uses. (See also W77-02649) (Katz)
W77-02656

FRESHWATER ECOLOGICAL EFFECTS,
Tennessee Valley Authority, Chattanooga.
H. R. Hickey, and P. A. Krenkel.
In: Proceedings of National Conference on Health, Environmental Effects, and Control Technology of Energy Use, Report 600/7-76-002, 1976. p. 132-137.

Descriptors: *Water quality, *Water resources, Aquatic environment, Mining, *Strip mines, *Strip mine lakes, Ecology, Public health, *Baseline studies, Mollusca, Freshwater, Insects, *Thermal power plants, Thermal water, Methodology, *Monitoring, Zooplankton, Toxicity, *Strip mine wastes.
Identifiers: *Surface mining, *Surface mining reclamation, Freshwater insects, Aquatic insects, Aquatic thermal impacts, Zooplankton entrainment, *Ecological recovery.

TVA's research efforts in the area of freshwater ecological effects include several tasks related to impacts of energy technologies on aquatic ecosystems, effects of strip and surface mining and reclamation on water quality and ecology, and one minor project to evaluate the role of strip mine pools in the production of disease-bearing arthropods. (See also W77-02649) (Katz)
W77-02657

THE EPA RESEARCH PROGRAM ON THE FRESHWATER ECOLOGICAL EFFECTS OF ENERGY DEVELOPMENT AND USE,
Environmental Protection Agency, Washington, D.C. Office of Health and Ecological Effects.
J. D. Yount.
In: Proceedings of National Conference on Health, Environmental Effects, and Control Technology of Energy Use, Report 600/7-76-002, 1976. p. 138-140, 2 ref.

Descriptors: *Water quality, Water resources, Aquatic environment, *Strip mining, Mining, *Baseline study, *Oil shale, Freshwater, Freshwater fish, Invertebrates, Microbiology, Bioassay, Toxicity, Transportation, *On-site investigations, *Thermal powerplants, Montana.
Identifiers: *On-site conversion, *Coal transportation, *Coal storage, *Oil pipelines.

The Environmental Protection Agency has research projects with five universities to explore the freshwater and watershed environmental degradation which results from coal and oil shale production. The projects hope to produce data which could help predict site selections for future energy sources and conversion facilities which would result in the minimum environmental degradation. (See also W77-02649) (Katz)
W77-02658

WILDLIFE AND OIL SHALE. A PROBLEM ANALYSIS AND RESEARCH PROGRAM.
Thorne Ecological Inst., Boulder, Colo.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-250 521, Price codes: A07 in paper copy, A01 in microfiche. 1975, 112 p, 3 fig, 33 ref. Coordinated by H. D. Burke.

Descriptors: *Mining, *Mine wastes, *Colorado, *Utah, *Wyoming, *Recreation facilities, Geology, Hydrology, *Wildlife habitats, Water quality, Aquatic environment, Aquatic populations, Terrestrial habitats, Fresh water fish, Invertebrates, Social aspects, *Wildlife, Oil shale.
Identifiers: *Reptiles, *Amphibians, *Oil shale development.

This program analysis and research program considers the natural and social environment of the Oil Shale Region of northwestern Colorado, northeastern Utah, and southwestern Wyoming. The purpose was to examine and evaluate the probable consequences of a developing oil shale industry upon the environment, to devise research studies that would evaluate environmental and social changes, and to assist in avoiding or mitigating undesirable changes, particularly as they pertain to wildlife. (See also W77-01236) (Katz)
W77-02659

BISCAYNE BAY AND ITS ENVIRONS. AN ANALYSIS OF ITS PRESENT AND FUTURE USES FOR METROPOLITAN DADE COUNTY,
General Oceanics, Inc., Miami, Fla.
T. W. Bilhorn.
Miami University Sea Grant Special Report No. 7, April 1976. 37 p, 4 fig, 1 tab, 15 ref. Originally issued September 1975.

Descriptors: *Florida, *Bays, *Water quality, *Coastal zone, *Pollution abatement, *Recreation demand, *Resources development, Conservation, Land use, Water utilization.
Identifiers: Environmental conditions, *Biscayne Bay(Fla), Resource management.

Biscayne Bay defines the eastern limit for the total length of Dade County. This 225 square mile water body is the single large open space immediately available to the 1 1/2 million residents of the metropolitan area. It is also the single large protected bay within the continental United States with a subtropical environment--allowing year-round usage for resident and winter tourists. Because of a mixture of natural and man-made features, the Bay divides into two units--North and South. There is a strong diversity of present use and future possibilities between these two areas. As any body of water, the Bay's internal circulation transfers the impact at one point to the remaining areas--sometimes rapidly, sometimes slowly. It is therefore a system in itself on a technical basis, and options for its use must recognize the natural factors as constraints. (NOAA)
W77-02680

BLOODSUCKING MOSQUITOES (DIPTERA, CULICIDAE) OF THE WHITE SEA COAST: III. BREEDING PLACES OF MOSQUITOES OF THE GENUS AEDES, (IN RUSSIAN),
Moscow State Univ. (USSR). Lab. of Zoology-Entomology.
K. V. Aleksandrova.
Biol Nauki (Mosc) 18(4), p. 18-23, 1975.

Descriptors: *Mosquitoes, *Breeding, Bogs, Coasts, Diptera, Forests, Meadows.
Identifiers: *Aedes species, Culicidae, Diptera, USSR, *White Sea(USSR), *Mosquito control.

The breeding places of 12 spp. of Aedes were found on the White Sea coast (USSR): A. communis, A. punctor, A. pullatus, A. impiger, A. hexodontus, A. pionips, A. dianteus, A. flavescens, A cinereus, A. caspius, A. intrudens and A. excrucians. These were forest, bog, meadow (littoral, floodplain), cliff and village bodies of water. They differed in temperature conditions, pH of the water, oxidizability of the water, content of dissolved O2, species composition of the mosquitoes and their abundance. Species diversity of the mosquitoes was greater in the bog, littoral and upper cliff water bodies (7 spp. in each) than in the forest and lower cliff water bodies (3 and 2 spp., respectively).--Copyright 1976, Biological Abstracts, Inc.
W77-02699

TWO DEVICES FOR REMOVING SUPERSATURATING GASES IN AQUARIUM SYSTEMS,
Fisheries and Marine Service, St. John's (Newfoundland). Biological Station
W. R Penrose, and W. R Squires
Transactions of American Fisheries Society, Vol. 105, No. 1, p. 116-118, 1976. 1 fig., 1 tab., 7 ref.

Descriptors: *Supersaturation, *Gases, Equipment, *Laboratory equipment, *Aquaria, *Fish diseases, Technology, Fish hatcheries, Laboratory tests, Design, Air-water interfaces.
Identifiers: *Dissolved gases.

Gas supersaturation in aquaria can be relieved by treatment of inflowing water with suitable apparatus. Two devices have been developed for this purpose. The first uses controlled agitation of falling water to bring about equilibrium and operates at flow rates near 40 liters/min; the second agitates the seawater with compressed air and is useful in the flow rate range 0 to 3 liters/min. These designs are modifiable to other flow rates (Katz)
W77-02706

ADVANCED WASTEWATER TECHNOLOGY, A SELECTIVE CODED BIBLIOGRAPHY,
Environmental Protection Service, Burlington (Ontario). Waste Water Technology Centre.
For primary bibliographic entry see Field 5D.
W77-02741

SPILL IN PORTUGAL, A REPORT OF THE JAKOB MAERSK INCIDENT,
Environmental Protection Service, Halifax (Nova Scotia). Atlantic Region.
F. C. Duerden.
Environmental Impact and Assessment Report EPS-8-EC-76-1, Ottawa, Canada, January 1976. 32 p, 12 fig, append.

Descriptors: *Oil spills, *Coasts, *Oil pollution, Sand bars, Burning, Explosions, Beaches, Disasters, Tourism, Booms, Oil-water interfaces, Mechanical equipment, Skimming.
Identifiers: *Grounding, *Jacob Maersk oil tanker, Oil tankers, *Portugal(Leixoes), Oil slicks, Containment, Cleanup, Skimmers, Dispersants, Mechanical removal, Chemical removal.

In late January 1975, the 88,000 dwt tanker JAKOB MAERSK grounded while entering the port of Leixoes in northern Portugal. Part of the cargo burned, part escaped to sea, and the remainder polluted the shoreline. The cleanup of the oil involved units of the Portuguese Army and Navy, as well members of other agencies and the general population. In spite of the massive amount of oil spilled in the accident, the effects of the spill were relatively slight, due to a well coordinated cleanup effort and a combination of fortunate circumstances. (Environment Canada)
W77-02752

CONTROLLED COMBUSTION TESTS CARRIED OUT NEAR RIMOUSKI,
Sherbrooke Univ. (Quebec). Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5E.
W77-02759

REVIEW OF ENVIRONMENTAL CONTROL OF MERCURY IN JAPAN,
Environmental Protection Service, Ottawa (Ontario).
L. Buffa.
Water Pollution Control Directorate, Economic and Technical Review Report EPS 3-WP-76-7, August 1976, 81p., 4 app., 10 fig, 6 tab, 11 ref.

Descriptors: *Mercury, Landfill, Concretes, Solid wastes, Surveys, Canada, Air pollution, Regulation, Effects, Treatment, Reviews, Environmental control.
Identifiers: *Chlor-alkali plant, Japan, Laws, Canadian Indians, Western Ontario.

Papers presented at the International Congress of Scientists on the Human Environment, Kyoto, Japan, 1975, relating to observations of Japanese scientists on the Canadian mercury pollution situation, have been summarized and are discussed. Japaese legislation relating to mercury discharges is reviewed, as well as compensation law, clean-up procedures, and financial assistance provided to chlor-alkali plants converting from mercury to diaphragm cells. Several industrial installations were visited, and the mercury measures and technology at two Japanese chlor-alkali plants are discussed in some detail. (Environment Canada)
W77-02761

URBAN DRAINAGE MODEL COMPARISON FOR A CATCHMENT IN HALIFAX, NOVA SCOTIA,
Nova Scotia Technical Coll., Halifax
For primary bibliographic entry see Field 2A.
W77-02764

PRACTICES, POLICIES AND TECHNOLOGY OF STORM AND COMBINED SEWERS IN FOREIGN COUNTRIES.
Albery, Pullerits, Dickenson and Associates Ltd., Don Mills (Ontario).
Canada-Ontario Agreement on the Great Lakes Water Quality, Research Report No. 45, Environmental Protection Service, Environment Canada, Ottawa, Canada, 169 p., 12 tab., 72 ref., 3 append. 74-8-17.

Descriptors: *Storm water, *Sewers, *Sewage, Governments, Costs, United States, Runoff, Research and Development, Water quality standards, *Combined sewers, Eurpe, Waste water treatment.
Identifiers: Sweden, France, Germany, United Kingdom, Switzerland, Historical backgrounds.

This study was undertaken to evaluate pollution problems associated with storm sewer discharges and combined sewer overflows in several European countries and the United States. Current methods used to abate pollution from these sources and research underway to develop new methods were also investigated. Since the magnitude of the problem and the approaches to its solution vary in each country according to the relationships between various levels of government, citizen action groups, industry and research groups, it was necessary to review the governmental structures, historical aspects, and present design criteria for all contributory features of storm and combined sewers in the countries studied. Questionnaires were distributed to local authorities, government departments, research organizations and consulting engineers in Sweden, France, the United Kingdom, Germany and Sw
zerland. In addition, research engineers visited
stallations in each country and interviewed k
personnel. This report reviews the information o
tained during the study and assesses the vario
methods of combatting pollution from storm a
combined sewers, both in the context of the cou
tries concerned, and in relation to the Canadi
situation. (Environment Canada)
W77-02767

SELECTION CRITERIA AND LABORATOR EVALUATION OF OIL SPILL SORBENTS.
Environmental Protection Service, Otta
(Ontario).
Technology Development Report EPS-4-EC-76
April 1976, 53 p., 5 fig., 11 tab., 10 ref. append
A Robertson, M F Fingas, I. B Solsbe
(Editors).

Descriptors: *Oil spills, *Oil-water interfac
Weight, Performance, Evaluation, Oil pollut
Water pollution control, Pollution abatement.
Identifiers: *Sorbents, *Oil characteristics, So
tion capacity, Sorbent type, Peat moss, Foam
Straws.

Twenty different types of oil spill sorbents w
studied in terms of desirable performance a
operational criteria. Initially, a preliminary labo
tory evaluation of the oil pick-up capacity
several oil sorbents was performed using a Cana
an western crude oil. Capacities were then cor
lated with sorbent prices to give oil sorption cos
Methods employed during this first evaluati
were then applied in a subsequent laborato
evaluation in which sorbent capacities were det
mined both in oil-only and oil/water environmen
During the course of these evaluations, maximu
sorbent capacity was correlated and compar
with the viscosity of the oil recovered. Simulat
field tests in outdoor tanks were also conducted
which crude oil and No. 2 fuel oil were spilled
order to determine both the oil pick-up capac
and the oil/water ratios of the sorbents un
study. Of those sorptive materials examined,
synthetic polymeric sorbents exhibited the high
oil pick-up capacities and oil/water rati
(Environment Canada)
W77-02769

IMPLICATIONS OF THE WATER POLLUTI CONTROL ACT OF 1972 FOR THE MINER RESOURCES INDUSTRY, A SURVEY.
Bureau of Mines, Washington, D.C. Div. of Mel
lurgy
Available from the National Technical Inform
tion Service, Springfield, VA 22161 as PB-245 9
Price codes: A04 in paper copy, A01 in microfic
Report No. BuMines IC 8681, September 1975.
p. 7 fig, 22 tab., 1 append

Descriptors: *Mineral industry, *Federal Wa
Pollution Control Act, Mills, Mining, Econor
impact, Capital costs, Operating costs, Costs, P
lution abatement, Water pollution control, A
mine water, Mine drainage, Waste water dispos
Idaho, Waste water treatment, Industrial wast
Water quality standards
Identifiers: *Effluent guidelines.

The cost of U.S. mining and milling industry co
pliance with the EPA interim water qual
guidelines for waste discharges are summari
and analyzed utilizing data obtained from Ar
Corps of Engineers applications for discharge p
mits. Cost of three basic treatment methods w
considered: (1) aeration of the waste stream,
addition of lime to raise pH, and (3) sedimentat
to remove solids. From the process design, co
capacity graphs were developed to consider m
imum flow rate, maximum lime addition,
average flow rates. Fixed capital costs, ann
operating costs, and operating cost per ton
product are reported by material being handled
is concluded that the cost of complying with

elines will prompt the mining industry to mize the production of waste water. Two case ies, the Bunker Hill electrolytic zinc plant and Bunker Hill acid mine drainage problem, are ented to illustrate possible actions to minimize e water production, and to treat combinations id mine drainage, mill wastes, and metallurgi- rocess wastes, when treatment is necessary. dtke-Wisconsin)
-02806

RROSION OF SELECTED MATERIALS IN E MEAD WATER,
ada Univ., Reno. Desert Research Inst.
primary bibliographic entry see Field 8G.
-02832

EMPIRICAL ANALYSIS OF PREDICTORS INCOME DISTRIBUTION EFFECTS OF TER QUALITY CONTROLS,
State Univ., Logan. Dept. of Economics.
Keith, M. C. Chen, D. C. Reading, and R. son.
lable from the National Technical Informa- Service, Springfield, VA 22161 as PB-262 010, e codes: A03 in paper copy, A01 in microfiche. Water Research Laboratory, Publication AE015-1, September 1976. 44 p, 1 fig, 3 tab, ef, 3 append. OWRT B-115-UTAH(1). 14-31- -5119.

criptors: *Income distribution, Control, ter quality control, *Methodology, ecasting, Regression analysis, Data collec- , *Income analysis, Prices, Model studies.
tifiers: Standard Metropolitan Statistical s, Lognormal methodology, Displaced log- al methodology, Distribution functions odology, *Simultaneous equation economet- odel.

imposition of water quality controls has been criticized and praised for its distributional im- s in the popular literature. Few, if any, empiri- measures of the distributional impact have attempted. This research had two objectives: , to analyze methodologies of measuring in- e distribution changes, and, second, to select opriate methodology and empirically test for mpacts of water quality controls. The lognor- displaced lognormal, gamma, and beta dis- ition functions were considered as appropriate odologies. Income distribution data were col- d from all Standard Metropolitan Statistical s (SMSA) in the United States, and parame- of each of the functions were estimated. A ltaneous equation econometric model was tructed, using a factor-share approach for e and price changes. Water quality controls introduced in the model through effects on es and mean family income, and the latter vari- s were included in equations estimating the parameters of the beta distribution function. er quality data were collected for all states, ndicies of quality were estimated using analy- f variance techniques. Regressions were run a total of 172 SMSA's, adjusted so that new A's or combined SMSA's from the 1960 data e 1970 data were deleted from the study.
-02833

IRONMENTAL IMPACT OF CHEMICALS,
Chemical Co., Midland, Mich.
Moolenaar.
apers of a Seminar on Early Warning Systems Toxic Substances, held on January 30-Februa- 1974, at Battelle Research Center, Seattle, hington (EPA-560/1-75-003, July 1975), p. 167- l tab.

riptors: *Chemicals, *Chemical industry, mical analysis, *Environmental effects, ins, *Toxicity, Poisons, Industrial wastes, ic health, Industrial plants.
tifiers: Synthetic chemical compounds.

Laboratory tests ranging from simple assessments to sophisticated evaluations are used to anticipate the environmental behavior of synthetic organic chemicals in terms of lifetime, movement, bioconcentration potential and spectrum of biological activity. The development process for a new compound by the chemical industry may be divided into four distinct stages, three of which are associated with a corresponding stage in testing the likely environmental impact of a new chemical. In the first stage, the chemical formula molecular structure and some basic properties are formulated, but no impact evaluation is yet attempted. In the second stage the compound is further characterized and general use categories are defined. Environmental impact at this stage is based on the parameters of stability, movement, bioconcentration and toxicity. The third, or pilot plant stage involves manufacture of the chemical in developmental quantities, and concomitant evaluation of the stage two parametrs in greater depth. In the fourth stage, early efforts are undertaken to market the product in commercial quantities. At this stage, the production plant itself becomes a potential source of discharge into the environment and observations of the surrounding area provide a good indication if the initial test data correctly predicted environmental impact. (See also W77-02835) (Harris-Wisconsin)
W77-02836

1974 - A YEAR OF TRANSITION,
Environmental Protection Agency, Washington, D. C. Office of Toxic Substances.
G. L. Schweitzer.
In: Papers of a Seminar on Early Warning Systems for Toxic Substances, held on January 30-February 1, 1974, at Battelle Research Center, Seattle, Washington (EPA-560/1-75-003, July 1975), p. 119-127.

Descriptors: *Chemicals, *Legal aspects, *Legislation, *Toxicity, Social aspects, Poisons, Water pollution effects, Industrial wastes, Pollution abatement, Standards, Economic impact, Social impact.

Highlights of domestic and foreign events and trends affecting environmental concerns during 1973 are reviewed, including actions by the Food and Drug Administration, Environmental Protection Agency, Department of Labor and certain state agencies impacting on regulation of toxic substances. Issues for 1974 are enumerated, including questions of : (1) the possibilities of improving toxicological testing and standard setting; (2) theretical versus pragmatic characteristics of risk/benefit aspects of toxic substances; (3) feasibility of making a generalized approach to developing control strategies for multimedia pollutants; (4) the practicality of an operational early warning system for toxic substances. Developments in the chemical industry are reviewed for their possible impacts on policy issues in toxic substance regulation and control. Generalized predictions are given for issues expected to arise in 1974, and recommendations are made for regulatory and control activities in the coming year. (See also W77-02835)
W77-02840

A COST-RISK-BENEFIT ANALYSIS OF TOXIC SUBSTANCES,
Environmental Protection Agency, Washington, D. C.
D. P. Tihansky, and H. Kibby.
In: Papers of a Seminar on Early Warning Systems for Toxic Substances, held on January 30-February 1, 1974, at Battelle Research Center, Seattle, Washington (EPA-560/1-75-003, July 1975), p. 93-117. 10 fig., 15 ref.

Descriptors: *Pollution abatement, *Cost-benefit analysis, *Toxins, Prices, Costs, Hazards, Decision making, Social aspects, Industrial wastes, Poisons, Evaluation, Public health, Economic impact.
Identifiers: *Cost-risk benefit analysis, Risk analysis.

An operational framework is presented which synthesizes cost-benefit analysis for product and service and risk analysis for health and ecology, to create a decision making tool through which public policy on toxic substances can be objectively derived to balance consumer demands for certain products against the environmental risks that they may engender. After risks and cost-benefit impacts are evaluated, the decision maker can compare them to set optimal control levels, setting standards so as to maximize the social welfare outcome of the decision. A number of approaches for doing this are given, with the appropriate choice dependent on the amount of risk-benefit data available to the decision maker as well as the preference for monetary versus nonmonetary values. Cost-risk benefit analysis can be simplified to some extent by minimizing costs of controlling toxic substances, subject to the avoidance of certain risks. But this objective neglects the often high value of products containing or generating toxic elements. Instead, the study assumes that the control costs are eventually paid by the consumer in the form of higher prices, and hence that product benefit changes will reflect these costs. (See also W77-02835) (Harris-Wisconsin).
W77-02844

THE WORLD HEALTH ORGANIZATION'S ENVIRONMENTAL HEALTH CRITERIA AND AIR MONITORING PROGRAMS,
National Environmental Research Center, Research Triangle Park, N.C.
F. G. Hueter, S. D. Shearer, and G. G. Akland.
In: Papers of a Seminar on Early Warning Systems for Toxic Substances, held on January 30-February 1, 1974, at Battelle Research Center, Seattle, Washington (EPA-560/1-75-003, July 1975), p 82-92.

Descriptors: *International commissions, *United Nations, *Public health, *Epidemology, *Human diseases, Toxicity, Air pollution, Water pollution effects, Diseases, Manganese, Polychlorinated biphenyls, Asbestos, Nitrogen compounds, Nitrates, Nitrites, Pollutants, Standards, Monitoring.
Identifiers: *World Health Organization.

Although the World Health Organization (WHO) as a United Nations body has no policy aimed at developing universally accepted working limits and other quality standards in their approach to environmental health measures, the organization does in fact promote agreement among international scientists on information related to the relationship between exposure to a given measure of a pollutant and accepted maximum levels of a pollutant in an organism or population group. From priority ranking of pollutants according to WHO's health criteria, agreement has been achieved on the need to examine effects of six substances: (1) oxides of nitrogen in ambient air; (2) mycotoxins, especially in largely agricultural tropical countries; (3) nitrates and nitrites in agriculture and food; (4) manganese, especially in its increasing use as a fuel additive; (5) polychlorinated biphenyls; and (6) asbestos. Procedures are described for preparing new WHO criteria documents and for preliminary reviews of pollution study procedures. Description is also given of the WHO air monitoring program, and its environmental health monitoring program. (See also W77-02835) (Harris-Wisconsin)
W77-02845

PUBLIC INTEREST METHODS FOR ASSESSING CHEMICAL HAZARDS,
Center for Science in the Public Interest, Washington, D.C.
For primary bibliographic entry see Field 5C.
W77-02846

LEGISLATION AND LAWS CONCERNING EARLY WARNING SYSTEMS FOR TOXIC SUBSTANCES,
Committee on Commerce (U. S. Senate).
M. B. Brownlee.
In: Papers of a Seminar on Early Warning Systems for Toxic Substances, held on January 30-February 1, 1974, at Battelle Research Center, Seattle, Washigton (EPA-560/1-75-003, July 1975), p. 35-44. 2 ref.

Descriptors: *Legal aspects, *Legislation, *Toxins, *Toxicity, Social aspects, Poisons, Monitoring, Pollutants, Hazards, Environmental effects, Warning systems, Pesticides.
Identifiers: *Toxic Substances Control Act, *Consumer products, Cosmetics, Food additives, Drugs.

As of early 1974, most existing federal legislation contained no mechanisms for the premarket or premanufacture review of environmental health and safety data for chemical substances. The most important class of environmental contaminants still unregulated were phosphates in detergents, heavy metals and other constituents of consumer products such as paint and drain cleaners, PCBs, packaging and certain other potential hazards. These and other materials which either escape sewage treatment or proper solid waste disposal, or which are more efficiently controlled by regulating the product instead of its disposal, were hazards that the Toxic Substances Control Act (pending in Congress in 1974) was designed to control. Review is given of existing premarket regulatory mechanisms for other hazards and potential hazards, including pesticides, drugs, food additives, antibiotics, insulin and cosmetics. Two broad principles are given for developing public policy on toxic early warning systems: First, the rigor of premarket review should vary with the implied magnitude of the risk involved for a specific chemical or other substance; and second, the greater the latitude given to a regulatory agency for premarket review, the greater the assurance must be that discretion will be used in the application of its powers. (See also W77-02835) (Harris-Wisconsin)
W77-02850

WATER QUALITY EFFECT OF DIKING A SHALLOW ARID-REGION LAKE,
Brigham Young Univ., Provo, Utah.
For primary bibliographic entry see Field 5C.
W77-02871

THE LOCATION OF INDUSTRIAL WATER USERS AND AIR POLLUTION: AN OVERLOOKED RELATIONSHIP,
Argonne National Lab., Ill. Energy and Environmental Systems Div.
For primary bibliographic entry see Field 5B.
W77-02877

DISTINCTIVE FEATURES OF SELF-PURIFICATION OF WATER AND SEDIMENTS OF A SHALLOW SEA AS EXEMPLIFIED BY THE SEA OF AZOV, (IN RUSSIAN),
Azovskii Nauchno-Issledovatelskii Institut Rybnogo Khozyaistva, Rostov-na-Donu (USSR).
A. B. Bronfman, A. Y. Aldakimova, G. D. Makarova, and L. I. Tolokonnikova.
Okeanologiya 16(1), p 91-97, 1976.

Descriptors: *Self purification, Bacteria, *Detergents, Microorganisms, *Oil pollution, *Water pollution, Seasonal, Sediments, Benthos, Oil wastes.
Identifiers: Russian-Sfsr, Shallow, *USSR, *Sea of Azov.

The spatial and seasonal changes in self-purification of the sea from oil products and detergents were studied in the Azov Sea. Farther from the coastal pollution source the self-purification is performed by different biological agents in succession. Four typical zones with specific self-purification were established. Contrary courses of pollution and self-purification processes characterize the pelagic and benthic regions of the sea. The peculiar seasonal dynamics of the self-purification processes in the shallow highly-productive area predetermine a steady accumulation of toxic matter in the benthic regions. (Bacteria and saprophytic microorganisms are mentioned.)--Copyright 1976, Biological Abstracts, Inc.
W77-02897

SELECTION OF STRAINS IN INVESTIGATIONS FOR HYGIENIC STANDARDIZATION OF THE BACTERIAL COMPOSITION OF DRINKING WATER, (IN RUSSIAN),
Moskovskii Gosudarstvennyi Meditsinskii Institut (I) (USSR).
For primary bibliographic entry see Field 5C.
W77-02900

STUDY OF SANITARY PROBLEMS IN CONNECTION WITH INTER-BASIN TRANSFER OF RIVER RUNOFF, (IN RUSSIAN),
Nauchno-Issledovatelskii Institut Gigieny, Moscow (USSR).
For primary bibliographic entry see Field 5C.
W77-02905

EFFECT OF HEAT-EXCHANGE WATERS OF A STATE REGIONAL ELECTRIC POWER PLANT ON CONDITIONS OF WATER USE BY THE POPULATION, (IN RUSSIAN),
Kemerovo State Medical Inst. (USSR).
Z. P. Lavygina.
Gig Sanit 12, p 90-92, 1975.

Descriptors: *Thermal pollution, Water pollution effects, Electric powerplants, Bacteriology, Water utilization, Water supply, Water quality standards, Attitudes, Water utilization.
Identifiers: USSR.

For 2 yr the effect of thermal waters of large electric power plants on the physiochemical and bacteriologic properties of water was studied on individual stretches of the Tom and Kondoma rivers (USSR) to establish the long-term effect of heat-exchange waters on the rivers and conditions of water use by the population. A questionnaire inquiry of the population using the heated water for drinking (centralized water supply) showed that most of the heated water for drinking (centralized water supply) showed that most of the population considered water with a temperature > 25C unacceptably warm.--Copyright 1976, Biological Abstracts, Inc.
W77-02906

EXPERIMENTAL SUBSTANTIATION OF THE MAXIMUM ALLOWABLE CONCENTRATION OF DIMIDE IN WATER BODIES, (IN RUSSIAN),
Academy of Medicine, Sofia (Bulgaria). Center for Hygiene.
For primary bibliographic entry see Field 5C.
W77-02907

EXPERIENCE IN CENTRALIZED COLLECTION, PROCESSING AND ANALYSIS OF SANITARY-HYGIENIC INFORMATION, (IN RUSSIAN),
Municipal Sanitary Epidemiology Station, Novokuznetsk (USSR).
For primary bibliographic entry see Field 5A.
W77-02908

TECHNIQUES FOR REDUCING TURBIDITY ASSOCIATED WITH PRESENT DREDGING PROCEDURES AND OPERATIONS,
Huston (John), Inc., Corpus Christi, Tex.
J. W. Huston, and W. C. Huston.
Available from the National Technical Inform tion Service, Springfield, VA 22161 as AD-A 623, Price codes: A06 in paper copy, A01 microfiche. Army Engineer Waterways Exp ment Station, Vicksburg, Mississippi. Contr Report Report D-76-4, May 1976. 99 p, 22 fi tab, 42 ref, 4 append.

Descriptors: *Dredging, *Turbidity, Water po tion control, Operations.
Identifiers: Dredged material.

Techniques for reducing turbidity associated w present dredging procedures and operations principally in the categories of the cutter, lad suction, hull, pipeline, connections, barges, ders, personnel, inspection, contracts, plans, specifications. Dredge-induced turbidity is mally apparent only in the immediate vicinity the dredge plant and the levels of this turbidity not usually as high as those created by open-w disposal of the dredged material. In addition to plying good dredging techniques to reduce turb ty, better inspection is needed on Corps of gineers (CE) and CE-related projects. More supervision of dredging operations needs to be plemented. More training is required for ins tors, whether CE or private-company person Contracts should clearly and uniformly spe requirements for turbidity-reduction measures measurements. (WES)
W77-02936

HYDROLOGIC STUDIES OF THE GEOLOGICAL SURVEY RELATED TO CO DEVELOPMENT IN COLORADO.
Geological Survey, Lakewood, Colo. W Resources Div.
Open-file report 76-549, August 1976. 22 p, 5 fig

Descriptors: *Baseline studies, *Water pollu tors, Whether CE or private-company person Surface waters, Groundwater, Sedime Hydrologic data, Water supply, Evaluation, jects, Environmental effects.
Identifiers: *Pre-coal-development studies(Col

This report summarizes the hydrologic studies lated to coal development being conducted by U.S. Geological Survey in the State of Colora The objective of the hydrologic data-acquisi program is to collect surface-water quality quantity data and ground-water level reco These data are needed to define predevelopm conditions and to monitor the effects of const tion and operation of coal mines and wa disposal areas. Data-acquisition activities rel to coal development in Colorado have con trated on the Yampa River basin. A descriptio the hydrologic data-acquisition activities, inc ing parameters collected and frequency of col tion, precedes the summaries of the three inter tive studies currently in progress. Each study s mary consists of the project title, definition of problem being studied, objective of the study, proach of the study, and when known, schedule for completion of the study and propo report products resulting from the st (Woodard-USGS)
W77-02970

AN OILSPILL RISK ANALYSIS FOR T NORTH ATLANTIC OUTER CONTINENT SHELF LEASE AREA,
Geological Survey, Reston, Va. Water Resour Div.; and Department of the Interior, Washingt D. C. Office of Policy Analysis.
For primary bibliographic entry see Field 5B.
W77-02972

PRELIMINARY RESULTS OF PREIMPOU MENT WATER-QUALITY STUDIES IN T TIOGA RIVER BASIN, PENNSYLVANIA A NEW YORK,
Geological Survey, Harrisburg, Pa. Wa Resources Div.

or primary bibliographic entry see Field 5B.
77-02977

/ATER RESOURCES ADMINISTRATION IN IRGINIA: ANALYSIS AND EVALUATION,
irginia Polytechnic Inst. and State Univ., lacksburg. Water Resources Research Center.
or primary bibliographic entry see Field 6B.
77-02996

HE EFFECT OF RIVER FLUCTUATIONS ESULTING FROM HYDROELECTRIC PEAK-IG ON SELECTED AQUATIC INVER-EBRATES AND FISH,
laho Univ., Moscow. Water Resources Research st.
. A. Brusven, and C. MacPhee.
vailable from the National Technical Informa-on Service, Springfield, VA 22161 as PB-262 079, rice codes: A04 in paper copy, A01 in microfiche. laho Water Resources Research Institute, oscow, Completion Report, September 1976. 46 18 fig, 8 tab, 23 ref. OWRT A-035-IDA(3), 14-0001-7027.

escriptors: Fluctuations, *Water level fluctua-ons, Hydroelectric power, Dams, Insects, nvertebrates, Caddisflies, Diptera, Mayflies, Aquatic insects, Fish, Salmonids, Chinook sal-on, Flumes, Bottom sampling, Diversion struc-res, *Idaho.
lentifiers: *Fluctuating shorelines, Dworshak am(Idaho), *Clearwater River(Idaho), Hydroelectric peaking, *Salmon River(Idaho).

iel changes in discharge caused by hydroelectric eaking directly affect water levels and indirectly ter benthos and fish abundance and distribution. uch effects on aquatic insect populations were easured during different peaking regimes below worshak Dam on the Clearwater River, Idaho. ere, the benthic insect community has remained latively stable, but shorelines experiencing daily uctuations are not readily colonized by some her species. Insects collectively reflected an ob-ous diel pattern, with the largest numbers drift-g at night. When converting the number of drift-g insects to a volume-flow relationship, the lar-st numbers were captured at a depth of 15 cm. A tal of 98 species, taken from 3 different depths, ere recorded. Flows in a diversion channel on the outh Fork of the Salmon River were manipulated simulate flow fluctuations below a power dam. n upstream section tested insects, a downstream ction-fish. During dewatering of the channel, alysis indicated that the insects did not seek eater interstitial depths and became displaced. epwise flow reduction caused corresponding duction in the number of chinook salmon. lthough seasonal carrying capacities of the chan-l differed, the proportion of fish remained about e same after each reduction in flow. A similar tuation was observed in an experimental labora-ry flume. The number of chinook changed rectly with the variation in the rate of flow. Ex-eme flow reductions significantly increased in-ct drift and the rate of ingestion by salmon.
77-03000

XTENSIVE OVERBURDEN POTENTIALS FOR OIL AND WATER QUALITY,
est Virginia Univ., Morgantown. Div. of Plant iences.
or primary bibliographic entry see Field 5B.
77-03008

HE MICROBIAL DEGRADATION OF OIL IN ONTINUOUS CULTURE,
ate Univ. of New York at Brockport. Dept. of ology.
or primary bibliographic entry see Field 5B.
77-03012

DETERMINATION OF ESTIMATED MEAN MINE WATER QUANTITY AND QUALITY FROM IMPERFECT DATA AND HISTORICAL RECORDS.
Environmental Quality Systems, Inc., Rockville, Md.
For primary bibliographic entry see Field 5B.
W77-03014

PURGING A MUDDY-EARTHY FLAVOR TAINT FROM RAINBOW TROUT (SALMO GAIRDNERI) BY TRANSFERRING TO ARTIFICIAL AND NATURAL HOLDING ENVIRONMENTS,
Fisheries and Marine Service, Winnipeg (Manitoba). Freshwater Inst.
D. G. Iredale, and R. K. York.
Journal of the Fisheries Research Board of Canada, Vol. 33, p. 160-166, 1976. 1 tab., 1 fig., 17 ref.

Descriptors: *Organoleptic properties, *Rainbow trout, *Trout, *Taste, Methodology, *Fish management, Fisheries, *Aquiculture, *Water quality, *Absorption, *Commercial fish foods, Algae, Water quality control, Salmonids.
Identifiers: Purging, *Muddy-earthy taint.

Studies were conducted to determine the length of time required to purge a muddy-earthy flavor taint from pond cultured rainbow trout (Salmo gairdneri) transferred to two different clear water environments. Sensory data from trained judges show that this required 5 days for fish transferred to a rapidly changing purified artificial water environment and 16 days for fish transferred to a relatively static natural water environment to reduce this taint to or below threshold levels of recognition. (Katz)
W77-03023

MEASURES TO COUNTERACT DAILY WATER POLLUTION: DEVELOPMENT TENDENCIES IN USA, (IN SWEDISH),
Swedish Council for Building Research, Stockholm.
For primary bibliographic entry see Field 5D.
W77-03035

WATER HYACINTHS FOR REMOVAL OF CADMIUM AND NICKEL FROM POLLUTED WATERS,
National Space Technology Labs., Bay St. Louis, Miss.
B. C. Wolverton.
Available from the National Technical Information Service, Springfield, VA 22161 as N75-16129, Price codes: A02 in paper copy, A01 in microfiche. NASA Technical Memorandum, TM-X-72721, February 1975, 10 p, 2 tab, 2 fig, 11 ref.

Descriptors: *Cadmium, *Nickel, Metals, Water pollution, Water pollution control, *Water hyacinth, Aquatic weeds, Aquatic plants, Plant physiology, Methodology, Laboratory tests, *Louisiana.

Removal of cadmium and nickel from static water systems utilizing water hyacinths (Eichhornia crassipes) (Mart.) Solms was investigated. This aquatic plant demonstrated the ability to rapidly remove heavy metals from aqueous systems by root absorption and concentration. Water hyacinths demonstrated the ability to absorb and concentrate up to 0.67 mg of cadmium and 0.50 mg of nickel per gram of dry plant material when exposed for a 24-hour period to waters polluted with from 0.578 to 2.00 ppm of these toxic metals. One hectare of water hyacinths has the potential of removing 300 g of cadmium or nickel from 240,000 liters of water polluted with these metals during a 24-hour period. (Katz)
W77-03041

THE EMERGENCE OF INSECTS FROM A BRITISH RIVER WARMED BY POWER STATION COOLING-WATER. PART I. THE USE AND PERFORMANCE OF INSECT EMERGENCE TRAPS IN A LARGE, SPATE-RIVER AND THE EFFECTS OF VARIOUS FACTORS ON TOTAL CATCHES, UPSTREAM AND DOWNSTREAM OF THE COOLING-WATER OUTFALLS,
Central Electricity Generating Board, Ratcliffe-on-Soar (England). Freshwater Biology Unit.
For primary bibliographic entry see Field 5C.
W77-03043

MINIMAL LEACHING WITH VARYING ROOT DEPTHS OF ALFALFA,
Agricultural Research Service, Riverside, Calif. Salinity Lab.
For primary bibliographic entry see Field 3C.
W77-03066

COMBINED EFFECTS OF LOW OXYGEN AND SALINITY ON GERMINATION OF A SEMI-DWARF MEXICAN WHEAT,
Escuela Nacional de Agricultura, Chapingo (Mexico). Colegio de Postgraduados.
For primary bibliographic entry see Field 3C.
W77-03068

FERTILIZER OR SALT LEACHING AS AFFECTED BY SURFACE SHAPING AND PLACEMENT OF FERTILIZER AND IRRIGATION WATER,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 3F.
W77-03072

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

OPTIMIZATION OF WATER RESOURCE SYSTEMS INCORPORATING EARTHQUAKE RISK,
California Univ., Los Angeles. School of Engineering and Applied Science.
J. A. Dracup, C. M. Duke, and S. E. Jacobsen.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 985. Price codes: A03 in paper copy, A01 in microfiche. Technical Completions Report, No. 36, Sept. 76. 45 p, 5 tab, 36 ref. (California Water Resources Center, Davis, Project UCAL-WRC-W-339) OWRT B-107 CAL(3), CAL (2), B-144-CAL(4) and B-159-CAL(3).

Descriptors: *Earthquake engineering, *Mathematical models, *Optimization, *Seismic design, Computer programs, Water resources development, *Water distribution systems, Methodology, Networks.

This 3-part interdisciplinary report develops the computational methodology for the optimal network synthesis of a water distribution system in a region of seismic activity. A mathematical programming model is developed whose optimal solution indicates which links of the network are to be constructed, the optimal flow size of each constructed link, and the seismic intensity level each constructed link should be designed to withstand. New standards and procedures of earthquake resistive design and siting of lifeline facilities are needed which reflect the acceptable risk of fatalities, disruption of human activities and property damage. The standards and procedures should be developed through joint efforts among industry associations, professional society committees and research organizations, subject to evaluation by field testing in future earthquakes. The chief ac-

complishment was providing a procedure with which to incorporate seismic risk into the optimal planning of a large scale water resource system. (Snyder-California, Davis)
W77-02831

AN EMPIRICAL ANALYSIS OF PREDICTORS OF INCOME DISTRIBUTION EFFECTS OF WATER QUALITY CONTROLS,
Utah State Univ., Logan. Dept. of Economics.
For primary bibliographic entry see Field 5G.
W77-02833

6B. Evaluation Process

PROCEEDINGS OF SEMINAR SESSIONS ON STATE WATER SUPPLY PLANNING, SEPT. - OCT. 1975, (EXECUTIVE SUMMARY).
Massachusetts Univ., Amherst. Water Resources Research Center.
Available from the National Technical Information Service, Springfield VA 22161 as PB-261 883, Price codes: A02 in paper copy, A01 in microfiche. WRRC Publication No 64, Partial Completion Report, (1976), 14 p. Editor: Barry R. Lawson. Co-Sponsored by Univ. of Mass. Water Resources Research Center and Div. of Water Resources, Mass. Dept. of Environmental Management. OWRT A-090-MASS(1).

Descriptors: *Planning, *Water supply, *Massachusetts, *Comprehensive planning, Regulation, *State governments, *Water policy, Water quality, Management.

A review of Massachusetts' experience by representatives of public agencies suggested that an outline exists of a de-facto water resources plan for the state, at least for the eastern Massachusetts component of that plan. This emerged from a review of the Corps of Engineers' Northeast Water Supply Study and the New England River Basins Commission's Southeast Water Supply Study. The need for additional diversion of water from the Connecticut River to eastern Massachusetts is one common element of the above studies as is the need for more intensive, yet flexible, planning to meet projected needs through 2020 is another. The importance of establishing strong authority for statewide planning by commitment of the Governor and Legislature was stressed as essential to an effective planning effort. Relevant issues discussed included: the need to relate water supply planning to more comprehensive water resource planning, the integration of water supply planning with area-wide waste water management planning and with formal policy of growth of the Commonwealth where this has been formally adopted. (See also W77-02619)
W77-02618

PROCEEDINGS OF SEMINAR SESSIONS ON STATE WATER SUPPLY PLANNING (SEPT.-OCT. 1975).
Massachusetts Univ., Amherst. Water Resources Research Center.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 885, Price codes: A11 in paper copy, A01 in microfiche. Water Resources Research Center Publication No 64, Completion Report FY-76-11, (1976), 234 p. OWRT A-090-MASS(2), 14-34-0001-6022.

Descriptors: *Planning, *Water supply, *Massachusetts, *Comprehensive planning, Regulation, *State governments, *Water policy, Water quality, Management.

The proceedings record the presentations and discussions of a series of seminars held in Boston in September and October 1975. The objectives of the series included a review of the Commonwealth's experience in water supply planning, specifying the goals of such planning, assessing the available knowledge including experience elsewhere, describing the steps required to establish a continuing statewide planning effort, and identifying needs for research and special studies to advance the overall program. Experience of other states (Illinois, New Jersey and Maryland) was examined. This examination stressed: (1) the essential role of the State in developing and maintaining a comprehensive plan for water supply and (2) the key interrelationship between planning and regulation. The experience of other states provided important insights on the objectives of statewide planning, on the components of a plan, and on the need for strong commitments to these efforts by the Governor, the Legislature and citizens of the State. Relevant issues discussed included: the need to relate water supply planning to more comprehensive water resource planning, the integration of water supply planning with area-wide waste water management planning and with formal policy of growth of the Commonwealth where this has been formally adopted. (See also W77-02618)
W77-02619

AN ENVIRONMENTAL OVERVIEW OF UNITED STATES ENERGY FUTURES,
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W77-02650

ATLANTIC OUTER CONTINENTAL SHELF ENERGY RESOURCES: ECONOMIC IMPLICATIONS FOR LONG ISLAND,
Cornell Univ. Agricultural Experiment Station, Ithaca, N. Y. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6G.
W77-02664

A COST-RISK-BENEFIT ANALYSIS OF TOXIC SUBSTANCES,
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W77-02844

A COMPARATIVE WATER QUALITY ANALYSIS OF SELECTED RECREATION LAKES AND STREAMS IN THE WHITE MOUNTAINS OF ARIZONA,
Arizona Univ., Tucson. School of Renewable Natural Resources.
For primary bibliographic entry see Field 5B.
W77-02866

HYDROLOGY,
Geological Survey, Raleigh, N.C. Water Resources Div.
R. L. Nace.
In: Handbook of Water Resources and Pollution Control: Published by Van Nostrand Reinhold Company, New York, N.Y., p 1-43, 1976. 8 tab, 70 ref.

Descriptors: *Planning, *Water resources development, *City planning, *Economic justification, *Ecology, Water management(Applied), Water allocation(Policy), Social aspects, Regional development, Evaluation.

Attempts to forecast future water needs generally are unrealistic because they are usually based on traditional modes of water use and traditional methods of planning. A new approach toward water and planning is necessary or the situation will indeed be serious by or before the end of this century. Water is not the governing element in development because few problems are solved by water alone. Water-rich Appalachia is a depressed area. Flourishing southern California is water-deficient. One of the more significant properties of water is its mobility. Since prehistoric time this property has permitted environmental manipulations on ever-increasing scales. This has culminated in the bad environment that is characteristic of many inhabited areas of the world today. The great problems of the future will be restoration and preservation of acceptable environmental quality. Water will be prominent but not the the dominant factor. Planning choices should no longer be made solely on a traditional benefit-cost ratio. Ecological impacts must also be considered. (Woodard-USGS)
W77-02968

WATER RESOURCES ADMINISTRATION IN VIRGINIA: ANALYSIS AND EVALUATION,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Water Resources Research Center.
W. R. Walker, and W. E. Cox.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 081, Price codes: A12 in paper copy, A01 in microfiche. Bulletin 107, December 1976, 258 p. OWRT B-025-VA(2).

Descriptors: Management, *Virginia, Water resources, *Administrative agencies, Water allocation(Policy), *Institutional constraints, *Administration, *Evaluation, Legal aspects, Water quality control, State governments.
Identifiers: *Interagency cooperation.

A description and analysis of the responsibilities of virginia's administrative agencies and other governmental entities related to water resources management is presented as a basis for evaluating the adequacy of the state's institutional framework for management. Since the existing structure consists of the exercise of specific management functions by several relatively independent management entities, the study explores possible gaps in existing authority, overlapping authority, and the existence of adequate coordination mechanisms between agencies and other government bodies operating in functionally related areas of responsibility. The study focuses primarily on the state's administrative agencies. Detailed consideration is given to the operations of the State Water Control Board, State Department of Health, Virginia Soil and Water Conservation Commission, Commission of Game and Inland Fisheries, State Corporation Commission, Council on the Environment, Department of Conservation and Economic Development, Commission of Outdoor Recreation, Virginia Institute of Marine Sciences and the Virginia Port Authority. The analysis also encompasses other agencies less directly involved in water resources management as well as other governmental bodies exercising such related responsibilities as local governments, interstate commissions, special districts, and the courts of the state. Recommendations to remedy deficiencies identified in the existing structure are presented in several areas, including water policy and management philosophy, water resources development, water quality, ground water, marine resources, water-oriented recreation, and statutory updating. A primary area of concern addressed in these recommendations involves allocation of water and coordination of water resources development. It is suggested that the executive arm of state government assume a more active role in water allocation and water supply planning, and that a higher degree of coordination of water resources development with applicable policy and plans is necessary. Water quality management is another area where institutional change is needed, especially with regard to centralization of administrative responsibilities and coordination of non-point pollution control with the state's primary water quality management program.
W77-02996

C. Cost Allocation, Cost Sharing, Pricing/Repayment

CONOMIC MODELS OF WASTER USE, ANN UTILIZATION EXPERIENCE, CASE TUDY NUMBER 4),
ouston Univ., Tex.
G. Thompson.
vailable from the National Technical Informa-n Service, Springfield, VA 22161 as PB-247 248, ice codes: A03 in paper copy, A01 in microfiche. 75. 26 p., 19 ref.

escriptors: *Industrial water, Water pollution, lethodology, *Model studies, Estimating, conomics, *Economic justification, *Value en-neering, *Electric power, *Chemical industry, ulp and paper industry, Waste treatment, Vater utilization.
entifiers: *Iron and steel industry, *Petroleum ining, *Water use models, *Industrial water es.

conomic modeling of industrial water use and stewater treatment began as a project to in-oduce industrial cost data and economic havior into planning directed toward meeting mands for water and controlling water pollution the major water-using industries: electric wer generation, iron and steel manufacturing, troleum refining, chemicals, and pulp and paper. e models developed during this research allow entification of methods for minimizing the costs production--when given effluent charges, prices r water, and other inputs or constraints on the oduction process, such as reducing the scharge of some pollutant. As the study has ogressed, project members have shifted the cus from model development to dissemination, d then to final documentation. It seems likely at much possible utilization lies in the future. atz)
77-02640

N EMPIRICAL ANALYSIS OF PREDICTORS F INCOME DISTRIBUTION EFFECTS OF ATER QUALITY CONTROLS,
ah State Univ., Logan. Dept. of Economics.
r primary bibliographic entry see Field 5G.
77-02833

D. Water Demand

IE EFFECTS ON AGRICULTURE IN UTAH F WATER TRANSFERS TO OIL SHALE EVELOPMENT,
ah State Univ., Logan. Dept. of Economics.
D. Gardner, K. S. Lyon, and R. Tew.
vailable from the National Technical Informa-n Service, Springfield, VA 22161 as PB-261 012, ce codes: A04 in paper copy, A01 in microfiche. ah Water Research Laboratory, Publication JAE-027-1, June 1976, 57 p, 8 fig, 13 tab, 5 ref. VRT A-027-UTAH(1). 14-34-0001-6046.

scriptors: *Institutional constraints, *Oil shale, unicipal water, Appropriations, *Water nsfer, *Water policy, *Utah, Agriculture, ater resources development, Colorado River sin, Prior appropriation, *Irrigation water, conomic impact, *Water demand.
ntifiers: Uintah Basin(Utah), White ver(Utah).

part I the institutional factors affecting water tribution in the Upper Colorado River Basin in neral and specifically the Uintah Basin are sented. The historical development of the ap-priation doctrine of water allocation is outlined l Utah water policy is examined. These institu-nal factors are analyzed in light of the prototype shale development in the Uintah Basin and ential impact on the area's agricultural sector. Oil shale water estimates are compared with Uintah Basin water availability and examined with regard to population projections and municipal water use. Utah water policy and the appropriation doctrine are viewed as restraints to efficient water transfers. In part II irrigation water is treated as a random variable. Its actual quantity is not known ahead of time. If transfers of water to oil shale production affect the variability of water used in agriculture then there will be impacts in agriculture even if the farmers receive the same average quantity of water as originally. These impacts are analyzed in the context of the expected utility maximization hypothesis, i.e., the farmers are hypothesized to maximize expected utility. The measure of an increase in variability is the 'mean preserving spread.' The analyses seek to determine the impact upon expected (average) real income (utility), expected profits (net farm income), purchased inputs, the price of water, and the price of land. The analyses are conducted for both the case where the farmers are risk neutral and where they are risk averse.
W77-02829

WATER QUANTITY REQUIREMENTS FOR PUBLIC SUPPLIES AND OTHER USES,
Geological Survey, Reston, Va. Water Resources Div.
J. C. Kammerer.
In: Handbook of Water Resources and Pollution Control: Published by Van Nostrand Reinhold Company, New York, N.Y., p 44-83, 1976. 9 fig, 20 tab, 45 ref.

Descriptors: *Water requirements, *Water utilization, *Water supply, *United States, Surface waters, Groundwater, Domestic water, Public utilities, Industrial water, Municipal water, Withdrawal.

Nearly two thirds of the water used (withdrawn or diverted from a source) in the United States in 1970 came from less than one third of its water-resource regions. Per capita use of water from public supplies nationwide averaged 165 gallons per day, including an estimated 75 gallons per person per day for residential uses. The largest residential water uses were for lawn watering, toilet flushing, and tub and shower bathing. Residential per capita use in 1963 (for some 100 cities, mostly large) ranged from 28 to 116 gallons per day in the 9 eastern regions and from 26 to 275 gallons per day in the 9 western regions in the conterminous United States. Maximum daily use was between 1.1 and 2.9 times the average daily use. Industries that are large water users are commonly self-supplied and not dependent on public-supply systems for most of their water. Water intake (withdrawals) by five groups of industries -- iron and steel, chemicals, pulp and paper, petroleum refining, and food -- accounts for more than 60 percent of the water used by all manufacturing industries; water for cooling is the biggest single type of water use in manufacturing. (Woodard-USGS)
W77-02969

6E. Water Law and Institutions

WASTEWATER REQUIREMENTS MULTIPLY SOLIDS PROBLEMS,
Texas Univ. at Dallas, Richardson.
For primary bibliographic entry see Field 5G.
W77-02601

QUEBEC ENVIRONMENTAL REGULATIONS IN THE TEXTILE INDUSTRY...AND ONE COMPANY'S SOLUTION,
For primary bibliographic entry see Field 5G.
W77-02611

PROCEEDINGS OF SEMINAR SESSIONS ON STATE WATER SUPPLY PLANNING, SEPT. - OCT. 1975, (EXECUTIVE SUMMARY).
Massachusetts Univ., Amherst. Water Resources Research Center.
For primary bibliographic entry see Field 6B.
W77-02618

PROCEEDINGS OF SEMINAR SESSIONS ON STATE WATER SUPPLY PLANNING (SEPT.-OCT. 1975).
Massachusetts Univ., Amherst. Water Resources Research Center.
For primary bibliographic entry see Field 6B.
W77-02619

THE EFFECTS ON AGRICULTURE IN UTAH OF WATER TRANSFERS TO OIL SHALE DEVELOPMENT,
Utah State Univ., Logan. Dept. of Economics.
For primary bibliographic entry see Field 6D.
W77-02829

LEGISLATION AND LAWS CONCERNING EARLY WARNING SYSTEMS FOR TOXIC SUBSTANCES,
Committee on Commerce (U. S. Senate).
For primary bibliographic entry see Field 5G.
W77-02850

WATER RESOURCES ADMINISTRATION IN VIRGINIA: ANALYSIS AND EVALUATION,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Water Resources Research Center.
For primary bibliographic entry see Field 6B.
W77-02996

6F. Nonstructural Alternatives

STORM TIDE FREQUENCY ANALYSIS FOR THE OPEN COAST OF VIRGINIA, MARYLAND, AND DELAWARE,
National Weather Service, Silver Spring, Md. Office of Hydrology.
For primary bibliographic entry see Field 2L.
W77-02661

ECONOMICS OF STORM PROTECTION,
Delaware Univ., Newark. Coll. of Marine Studies.
L. G. Anderson, and C. Kellogg.
Sea Grant Technical Report No. DEL-SG-20-76, (1976), 13 p, 3 fig, 3 tab, 3 ref.

Descriptors: *Economics, *Coasts, *Weather data, *Hurricanes, *Cost-benefit analysis, *Climatic data, *Meteorological data, *Delaware, Shore protection, Damages.
Identifiers: Storm protection, Cost effectiveness.

There are two fundamental steps in the design of any storm protection system--predicting the frequency and severity of large storms and designing and implementing an appropriate protection plan. The key to improving storm protection in Delaware is to use historical weather data to evaluate the cost effectiveness of long-run protection methods such as building revetments, maintaining sand dunes and adopting building codes and zoning laws. This study develops a method for evaluating the cost effectiveness of any type of long-run protection measure. Demonstrations of that method show that more restrictive zoning or building codes would cost more than they would save, and that there is some indication that variances in certain cases may lead to net savings. The method also was used to analyze a proposed Army Corps of Engineers project for the Delaware coast. (NOAA)
W77-02672

OPTIMIZATION OF WATER RESOURCE SYSTEMS INCORPORATING EARTHQUAKE RISK,
California Univ., Los Angeles. School of Engineering and Applied Science.
For primary bibliographic entry see Field 6A.
W77-02831

6G. Ecologic Impact Of Water Development

ENVIRONMENTAL OUTLOOK: WHERE WE STAND, WHAT'S AHEAD,
For primary bibliographic entry see Field 5G.
W77-02580

SYNCRUDE VOWS ENVIRONMENTAL RESPONSIBILITY,
Syncrude Canada Ltd., Edmonton (Alberta)
For primary bibliographic entry see Field 5D.
W77-02600

THE ENVIRONMENTAL FATE OF SELECTED POLY-NUCLEAR AROMATIC HYDROCARBONS,
Stanford Research Inst., Menlo Park, Calif.
For primary bibliographic entry see Field 5B.
W77-02625

THE MARINE BIOLOGICAL IMPACT OF THE HONOLULU GENERATING STATION,
Hawaii Univ., Honolulu. Sea Grant Program.
For primary bibliographic entry see Field 5C.
W77-02631

PARTICIPATION OF ERDA IN THE TRANSPORT AND ECOLOGICAL EFFECTS CATEGORIES OF THE PASS-THROUGH PROGRAM,
Energy Research and Development Administration, Washington, D. C.
For primary bibliographic entry see Field 5G.
W77-02654

FRESHWATER ECOLOGICAL EFFECTS,
Tennessee Valley Authority, Chattanooga.
For primary bibliographic entry see Field 5G.
W77-02657

THE EPA RESEARCH PROGRAM ON THE FRESHWATER ECOLOGICAL EFFECTS OF ENERGY DEVELOPMENT AND USE,
Environmental Protection Agency, Washington, D.C. Office of Health and Ecological Effects.
For primary bibliographic entry see Field 5G.
W77-02658

WILDLIFE AND OIL SHALE. A PROBLEM ANALYSIS AND RESEARCH PROGRAM.
Thorne Ecological Inst., Boulder, Colo.
For primary bibliographic entry see Field 5G.
W77-02659

PROCEEDINGS OF THE TWENTY-EIGHTH ANNUAL GULF AND CARIBBEAN FISHERIES INSTITUTE.
Rosenstiel School of Marine and Atmospheric Science, Miami, Fla.
For primary bibliographic entry see Field 5C.
W77-02660

ATLANTIC OUTER CONTINENTAL SHELF ENERGY RESOURCES: ECONOMIC IMPLICATIONS FOR LONG ISLAND,
Cornell Univ. Agricultural Experiment Station, Ithaca, N. Y. Dept. of Agricultural Economics.
R. J. Kalter, and W. E. Tyner.
Report No. A.E.Res.75-1, April 1975. 85 p, 2 fig, 23 tab, 48 ref.

Descriptors: *Atlantic coastal plain, *New York, *Oil industry, *Resources development, Economics, *Coastal plains, *Oil spills, *Oil pollution, *Environmental effects, Social impact, Geology, Natural gas, Leases, Energy, Continental Shelf, Income, Employment.
Identifiers: *Outer Continental Shelf, *Energy resources, Petroleum reserves, Coastal zone, Refineries, Oil refineries, Production costs.

Three major issues are considered. First the potential impacts (both gross and net) of Atlantic Outer Continental Shelf (AOCS) activities on employment and income within the Long Island region are discussed. Second, required changes in the provision of and expenditures for public services are separately evaluated. Third, potential changes in the recreation and fishing sectors due to offshore petroleum production are analyzed. The AOCS production possibilities for the Mid-Atlantic region are reviewed. Hypothetical reserve estimates by region are provided along with projected costs of exploration and development. Alternative assumptions on timing and location of offshore leasing are analyzed to determine the sensitivity of analytical results to the leasing schedule. The economic and social impacts on Nassau and Suffolk counties are examined. Included in this analysis are potential impacts of exploration, development and productive activity. Direct and indirect income and employment impacts are focused on but fiscal implications for local governments are also reviewed. (NOAA)
W77-02664

THE ARCTIC COASTAL ENVIRONMENT OF ALASKA. VOL. II: A COMPILATION AND REVIEW OF SCIENTIFIC LITERATURE OF THE ARCTIC MARINE ENVIRONMENT,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 5C.
W77-02665

ABSTRACTS. SPECIAL SYNPOSIUM - THE MIDDLE ATLANTIC CONTINENTAL SHELF AND NEW YORK BIGHT,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
For primary bibliographic entry see Field 5C.
W77-02678

THE METULA OIL SPILL,
National Oceanic and Atmospheric Administration, Boulder, Colo. Marine Ecosystems Analysis Program Office.
For primary bibliographic entry see Field 5C.
W77-02679

BISCAYNE BAY AND ITS ENVIRONS. AN ANALYSIS OF ITS PRESENT AND FUTURE USES FOR METROPOLITAN DADE COUNTY,
General Oceanics, Inc., Miami, Fla.
For primary bibliographic entry see Field 5G.
W77-02680

COASTAL ZONE BOUNDARIES.
Delaware State Planning Office, Dover. Coastal Zone Management Program - Public Involvement.
For primary bibliographic entry see Field 2L.
W77-02685

ASSATOAGUE MARINE SANCTUARY: A CASE STUDY,
Virginia Inst. of Marine Science Gloucester Point.
M. P. Lynch, T. F. Smolen, B. L. Laird, and M. A. Patton.
Special Scientific Report No. 94, November 1974. 145 p, 6 append. No. 3-35406.

Descriptors: *Ecology, *Conservation, *Water conservation, *Resources, *Natural resources, *Virginia, *Maryland, Shores, Coasts, Public law, Fisheries.
Identifiers: Resource conservation, Sanctuaries, Marine sanctuaries, Coastal zone, Nation, seashore, Marine parks, Governmental policy formulation, Coastal zone management.

The resources of the Assateague Island region, particularly those in the Chincoteague Bay-Sinepuxent Bay complex would be greatly benefited by protection against development on the western shore of this bay complex. Environmental interests in the Assateague region support the designation of a marine sanctuary to serve this purpose. Local populace believe that existing controls are adequate to protect the region. Physiographically and ecologically the region is ideal for a sanctuary in that it is, plarticularly on the bay side, essentially self contained and subject to little influence from without the area. Assateague Island itself is a barrier island with sand beaches on the ocean side and marshes on the Chincoteague Bay-Sinepuxent Bay side. The Chincoteague Bay complex is a very shallow body of water. Twenty-four percent of the shoreland is presently used for agriculture, 21% is unmanaged (mostly wooded) and 10% is residential. Twenty-three percent is dedicated to recreation and approximately 19% is held as preserved area. Careful public education activities and attention to proposed sanctuary regulations will probably go a long way to mitigating general resentment of an increased federal role in the area management. (NOAA)
W77-02686

GEOGRAPHIC AREAS OF PARTICULAR CONCERN.
Delaware State Planning Office, Dover. Coastal Zone Management Program - Public Involvement.
For primary bibliographic entry see Field 2L.
W77-02687

PROBABILISTIC TRAJECTORY ASSESSMENTS FOR OFFSHORE OIL SPILLS IMPACTING LONG ISLAND,
Massachusetts Inst. of Tech., Cambridge.
For primary bibliographic entry see Field 5B.
W77-02689

NTA (NITRILOTRIACETIC ACID) - ... ECOLOGICAL APPRAISAL,
Environmental Protection Service, Otta... (Ontario).
For primary bibliographic entry see Field 5B.
W77-02770

ON THE HABITABILITY OF MARS, AN ... PROACH TO PLANETARY ECOSYNTHESIS.
Ames Research Center, Moffett Field, Calif.
Report No. NASA SP-414, 1976. 116 p, 18 fig, tab, 16 ref, 2 append. Edited by M. M. Aven and R. D. Mac Elroy.

Descriptors: *Environmental engineering, *Habitats, *Aerobic conditions, Adaptation, ... matology, Physical properties, Chemical properties, Energy budget, Ultraviolet radiation, *Ecology, Cyanophyta, Lichens, Photosynthesis, Computer models, Temperature control, Oxygen, *Ecosystems.
Identifiers: *Mars, Bioengineering.

The theoretical colonization of Mars by terrestrial life, including man, is examined based on the potentiality of photosynthetic oxygen generation by lichens and blue-green algae. A computer model of cyanophyta and lichen predicts that the former could generate approximately 5 mbar of oxygen in 7000 years. To produce an amount necessary for human breathing (ca. 100 mb) would take 140,000 years. The lichens would take approximately 10 times longer. The study considers modification of the Martian climate by means of advective and greenhouse heating to enhance the prospects for microbiological growth.

the possibility of adapting photosynthetic or-
isms to the present or modified Martian en-
nment by bioengineering. Such genetic modifi-
ons might dramatically increase the probability
enerating an oxygen atmosphere and greatly
ease the time needed for its generation. The
y approach is based on the Martian orbital
meters, atmospheric parameters and composi-
, surface winds, solar and ultraviolet radiation,
ace temperature in Kelvin units, polar cap
meters, and a chemical inventory. It is
rized that water ice is available in the polar
and that photosynthetic organisms can
luce an ozone shield against the intensive ul-
iolet radiation. (Auen-Wisconsin)
-02810

VIRONMENTAL EVALUATION OF WATER OURCES DEVELOPMENT,
as A and M Univ., College Station. Dept. of
ironmental Engineering.
. James, C. E. Woods, and R. E. Blanz.
ilable from the National Technical Informa-
Service, Springfield, VA 22161 as PB-262 011,
e codes: A11 in paper copy, A01 in microfiche.
as Water Resources Institute, College Station,
pletion Report, TR-76, July 1976. 249 p, 36
17 tab, 91 ref, 12 append. OWRT A-028-
(1). 14-31-0001-5044. 14-34-0001-6045.

criptors: *Environmental effects, Reservoirs,
ning, *Aerial photography, Vegetation,
logy, *Remote sensing, Geomorphology,
ter resources development, Environment,
xas, *Topographic mapping, Regional analy-
Evaluation.
tifiers: *Environmental impact.

hodology for the utilization of LANDSAT-1
gery and aerial photography on the environ-
tal evaluation of water resources development
esented. Environmental impact statements for
r resource projects were collected and
ewed for the various regions of Texas. The en-
nmental effects of channelization and surface
undments are discussed for twelve physio-
hic regions of the state as delineated on black
white satellite (LANDSAT-1) mosaic of band
ith the aid of LANDSAT-1 imagery, represen-
e or typical transects were chosen within each
n. Profiles of each site were constructed from
graphic maps and environmental data were
mulated for each site and related to low al-
e aerial photography and enlarged LAND-
-1 false color composites. Each diagrammatic
ect, with accompanying data and photo-
hs, provides significant information for input
vironmental amenities on a local and regional
into preliminary water resources develop-
studies. The utilization of the transects pro-
a visual display of available information,
in the identification and inventory of
rces, assists in the identification of data gaps
provides a planning tool for additional data
isition. Remote sensing techniques are readily
ted to water resources planning. LANDSAT-
gery as well as conventional low altitude aeri-
otography provides the planner with a synop-
verview of the resource area. The delineation
ysiographic regions by LANDSAT-1 imagery
be helpful in defining delicate border areas
delineating broad environmental areas. Satel-
nagery is applicable for transect siting in aeri-
er basin studies or regional analysis.
-02828

ERS OF A SEMINAR ON EARLY WARN- SYSTEMS FOR TOXIC SUBSTANCES, FERENCE REPORT,
lle Memorial Inst., Seattle, Wash.
rimary bibliographic entry see Field 5A.
-02835

IRONMENTAL IMPACT OF CHEMICALS,
Chemical Co., Midland, Mich.
rimary bibliographic entry see Field 5G.

W77-02836

1974 - A YEAR OF TRANSITION,
Environmental Protection Agency, Washington, D. C. Office of Toxic Substances.
For primary bibliographic entry see Field 5G.
W77-02840

REVIEW OF HEALTH/ENVIRONMENTAL SYSTEMS WITH POTENTIAL EARLY WARNING APPLICATIONS,
Battelle-Columbus Labs., Ohio.
For primary bibliographic entry see Field 5A.
W77-02841

A RESEARCH PROGRAM TO ACQUIRE AND ANALYZE INFORMATION ON CHEMICALS THAT IMPACT ON MAN AND HIS ENVIRONMENT,
Stanford Research Inst., Menlo Park, Calif.
For primary bibliographic entry see Field 5A.
W77-02842

NATIONAL CANCER INSTITUTE PROGRAM OF CANCER SURVEILLANCE, EPIDEMIOLOGY AND END RESULTS REPORTING (SEER PROGRAM),
National Cancer Inst., Bethesda, Md. Biometry Branch.
For primary bibliographic entry see Field 5A.
W77-02843

THE WORLD HEALTH ORGANIZATION'S ENVIRONMENTAL HEALTH CRITERIA AND AIR MONITORING PROGRAMS,
National Environmental Research Center, Research Triangle Park, N.C.
For primary bibliographic entry see Field 5G.
W77-02845

EARLY-WARNING SYSTEM FOR TOXIC SUBSTANCES: HUMAN HEALTH ASPECTS,
National Environmental Research Center, Research Triangle Park, N.C.
For primary bibliographic entry see Field 5A.
W77-02847

HYDROLOGY,
Geological Survey, Raleigh, N.C. Water Resources Div.
For primary bibliographic entry see Field 6B.
W77-02968

AN OILSPILL RISK ANALYSIS FOR THE NORTH ATLANTIC OUTER CONTINENTAL SHELF LEASE AREA,
Geological Survey, Reston, Va. Water Resources Div.; and Department of the Interior, Washington, D. C. Office of Policy Analysis.
For primary bibliographic entry see Field 5B.
W77-02972

IMPACTS OF CONSTRUCTION ACTIVITIES IN WETLANDS OF THE UNITED STATES,
Tereco Corp., College Station, Tex.
For primary bibliographic entry see Field 5C.
W77-03007

7. RESOURCES DATA

7A. Network Design

OPTIMAL RAINGAGE DENSITIES AND ACCUMULATION TIMES: A DECISION-MAKING PROCEDURE,
Oklahoma Univ., Norman. Dept. of Meteorology.
For primary bibliographic entry see Field 2B.
W77-02798

7B. Data Acquisition

AN ANALYSIS OF GREAT LAKES ICE COVER FROM SATELLITE IMAGERY,
National Oceanic and Atmospheric Administration, Ann Arbor, Mich. Great Lakes Environmental Research Lab.
For primary bibliographic entry see Field 2C.
W77-02676

SCANNING THERMAL PLUMES,
Wisconsin Univ., Madison. Marine Studies Center.
For primary bibliographic entry see Field 5A.
W77-02682

A SEQUENTIAL APPROACH TO THE COUNTING OF PLANKTON ORGANISMS,
Pavia Univ. (Italy).
F. Moller, and M. Bernhard.
Journal of Experimental Marine Biology and Ecology, Vol. 15, p. 49-68, 1974. 6 fig., 7 tab., 8 ref.

Descriptors: *Methodology, *Analytical techniques, Animal populations, *Aquatic populations, *Biological communities, *Plankton, *Sampling, *Surveys, Census, Distribution, Statistical methods.

A counting strategy is described by means of which it is possible to decide, after carrying out a few counts, whether a sampled plankton population can be considered homogeneously distributed. The time saving of the proposed strategy lies in the fact that if the underlying population is homogeneously distributed only one count such as the count of the mixture of aliquots taken from all individual samples collected, would be necessary to characterize the population sufficiently. The count of this mixture may be considered as a 'mean value' equivalent to the mean obtained from the counts of all individual samples. With some experience in predicting where homogeneously and where heterogeneously distributed populations are sampled, it is possible to mix large numbers of samples and thus save a great amount of effort in the analysis of plankton populations. The samples may be collected during a survey in any way desired. (Katz)
W77-02721

INSTRUMENTATION FOR FIELD STUDIES OF URBAN RUNOFF,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5A.
W77-02749

THE MEASUREMENT AND ESTIMATION OF POTENTIAL EVAPOTRANSPIRATION,
SCITRAN, Santa Barbara, Calif.
For primary bibliographic entry see Field 2D.
W77-02802

REX, A COMPUTER CONTROLLED ROBOT FOR IN SITU WATER QUALITY MONITORING,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5A.
W77-02814

TROPHIC CLASSIFICATION OF LAKES USING LANDSAT-1 (ERTS-1) MULTISPECTRAL SCANNER DATA,
Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5A.
W77-02825

ENVIRONMENTAL EVALUATION OF WATER RESOURCES DEVELOPMENT,
Texas A and M Univ., College Station. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 6G.
W77-02828

METHOD OF MARKING AQUATIC COLEOPTERA, (IN FRENCH),
Neuchatel Univ. (Switzerland). Institut de Zoologie.
M. Brancucci.
Mitt Schweiz Entomol Ges 48(3/4), p 455-459, 1975.

Descriptors: *Marking techniques, Methodology, *Aquatic insects, Equipment, Sampling, Tagging.
Identifiers: Acilus, Agabus, Aquatic, *Coleoptera, Colymbetes, Copelatus, Cybister, Dytiscus, Graphoderus, Hydaticus, Hydrophilus, Hydroporus, Hydrous, Hyphydrus, Ilybius, Laccophilus, Noterus, Rhantus.

The problems caused by previously used methods are described. A description is given of an apparatus using a dentist's drill driven by a 6 V motor, the insect being immobilized inside a cylinder with a screen at one end and a piston covered with sponge rubber. A marking code is proposed and the limits of the method discussed. The technique was used for marking such genera as: Dytiscus, Cybister, Acilius, Graphoderus, Hydaticus, Copelatus, Agabus, Ilybius, Colymbetes, Rhantus, Hyphydrus, Hydrous, Hydrophilus, Noterus, Laccophilus and Hydroporus.--Copyright 1976, Biological Abstracts, Inc.
W77-02920

USE OF AUTOMATED REMOTE SENSING TECHNIQUES TO DEFINE THE MOVEMENT OF TOW-GENERATED SUSPENDED MATERIAL PLUMES ON THE ILLINOIS AND UPPER MISSISSIPPI RIVERS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 2J.
W77-02957

MAPPING AND MEASURING LAND-COVER CHARACTERISTICS OF NEW RIVER BASIN, TENNESSEE, USING LANDSAT DIGITAL TAPES,
Geological Survey, Nashville, Tenn. Water Resources Div.
For primary bibliographic entry see Field 4A.
W77-02978

DISCHARGE COMPUTATIONS AT RIVER CONTROL STRUCTURES,
Geological Survey, Jackson, Miss. Water Resources Div.
For primary bibliographic entry see Field 4A.
W77-02986

A NEW TOWED UNDERWATER CAMERA SYSTEM FOR WIDE-RANGE BENTHIC SURVEYS,
Vienna Univ. (Austria). Lehrkanzel fuer Meeresbiologie.
R. Machan, and K. Fedra.
Marine Biology, Vol. 33, p. 75-84, 1975. 5 fig, 26 ref.

Descriptors: *Methodology, *On-site data collection, *Photography, *Cameras, *Surveys, *Analytical techniques, *Benthos, *Distribution patterns, *Sampling, Research equipment, Instrumentation, Design, Engineering, Biomass, Data collections, Pollutant identification.
Identifiers: Underwater surveys, *TV-camera.

Following a short review of previous underwater camera systems, a new combined underwater camera system, consisting of a remote controlled TV- and photocamera mounted on a ship-towed steel-tubing sled, is described. The method of using this apparatus for wide-range surveys of the marine littoral benthos, and the techniques used to evaluate and quantify the observations are presented. On the basis of first results obtained in the North Adriatic Sea, the efficiency of the new system is compared with various other instruments and techniques. Advantages and disadvantages, possible improvements, and future prospects are discussed. (Katz)
W77-03030

A DEVICE FOR ISOLATING FIELD SOIL COLUMNS WITH MINIMUM DISTURBANCE,
Texas A and M Univ., College Station. Dept. of Soil and Crop Sciences.
For primary bibliographic entry see Field 2G.
W77-03065

A COMPACTION APPARATUS FOR THE PREPARATION OF SOIL CORES OF DIFFERENT BULK DENSITIES AND THICKNESSES,
Mississippi State Univ., Mississippi State. Dept. of Agronomy
For primary bibliographic entry see Field 2G.
W77-03067

7C. Evaluation, Processing and Publication

GRAPHICAL INTERPRETATION OF WATER QUALITY DATA,
Mississippi State Univ., Mississippi State. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5A.
W77-02592

PHYSICAL AND BIOLOGICAL EFFECTS OF THERMAL DISCHARGES AT LA CYGNE LAKE, VOLUME II: PROCEDURES AND SELECTED FIELD DATA,
Kansas Water Resources Research Inst., Manhattan.
For primary bibliographic entry see Field 5C.
W77-02617

COMPILATION OF STATE DATA FOR EIGHT SELECTED TOXIC SUBSTANCES, VOL. V, MONITORING PROGRAM CAPABILITY, DESCRIPTOR TABLES,
Mitre Corp., McLean, Va.
For primary bibliographic entry see Field 5G.
W77-02641

COMPILATION OF STATE DATA FOR EIGHT SELECTED TOXIC SUBSTANCES. VOLUME II, DIRECTORY OF STATE TOXIC SUBSTANCES MONITORING AGENCIES,
Mitre Corp., McLean, Va.
For primary bibliographic entry see Field 5G.
W77-02642

GREAT LAKES ICE COVER, WINTER 1974-75,
National Oceanic and Atmospheric Administration, Ann Arbor, Mich. Great Lakes Environmental Research Lab.
For primary bibliographic entry see Field 2C.
W77-02677

COMPUTER-AIDED PLANNING OF REGIONAL SLUDGE DISPOSAL SYSTEMS, USER'S MANUAL,
B and P Engineers, Kitchener (Ontario).
For primary bibliographic entry see Field 5D.
W77-02745

COMPUTERIZED SCHEME FOR THE IDENTIFICATION OF AEROMONADS AND MEMBERS OF THE FAMILY ENTEROBACTERIACEAE,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5A.
W77-02758

URBAN DRAINAGE MODEL COMPARISON FOR A CATCHMENT IN HALIFAX, NOVA SCOTIA,
Nova Scotia Technical Coll., Halifax.
For primary bibliographic entry see Field 2A.
W77-02764

ENVIRONMENTAL INVENTORY AND ASSESSMENT OF NAVIGATION POOLS 24, 25, 26, UPPER MISSISSIPPI AND LOWER ILLINOIS RIVERS: AN AQUATIC ANALYSIS,
Army Engineer Waterways Experiment Station Vicksburg, Miss. Environmental Effects Lab
For primary bibliographic entry see Field 5A.
W77-02826

ENVIRONMENTAL EVALUATION OF WATER RESOURCES DEVELOPMENT,
Texas A and M Univ., College Station. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 6G.
W77-02828

FEASIBILITY OF MONITORING FLOW PATTERNS AND SEDIMENT AND POLLUTANT DISPERSION OF WATER BODIES WITH 24 CHANNEL SPECTRAL DATA,
Army Engineer Waterways Experiment Station Vicksburg, Miss.
For primary bibliographic entry see Field 5B.
W77-02946

RECORDS OF WELLS AND WATER QUALITY FOR THE GARBER-WELLINGTON AQUIFER NORTHERN OKLAHOMA AND SOUTHERN LOGAN COUNTIES, OKLAHOMA,
Geological Survey, Oklahoma City, Okla. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-02974

DIGITAL-SIMULATION MODEL OF THE WENONAH-MOUNT LAUREL AQUIFER IN THE COASTAL PLAIN OF NEW JERSEY,
Geological Survey, Trenton, N. J Water Resources Div.
For primary bibliographic entry see Field 2F.
W77-02975

MAPPING AND MEASURING LAND-COVER CHARACTERISTICS OF NEW RIVER BASIN, TENNESSEE, USING LANDSAT DIGITAL TAPES,
Geological Survey, Nashville, Tenn. Water Resources Div.
For primary bibliographic entry see Field 4A.
W77-02978

SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70: PART 1. NORTH ATLANTIC SLOPE BASINS--VOLUME 2. BASINS FROM NEW YORK TO DELAWARE.
Geological Survey, Reston, Va. Water Resources Div.
Available from Branch of Distribution, USGS, 1200 S. Eads St., Arlington, VA 22202, price $7.
Water-Supply Paper 2102, 1976. 985 p, 1 fig

Descriptors: *Hydrologic data, *Surface water, *Streamflow, *Lakes, *Northeast U.S., Delaware, Massachusetts, New Jersey, New York, Penn

vania, Vermont, Basic data collections, Runoff, Discharge(Water), Gaging stations, Flow measurement, Flow rates, Average flow, Reservoirs, Reservoir stages.
Identifiers: *North Atlantic slope basins, Maximum discharges, Minimum discharges, Reservoir content.

This is one of 37 reports presenting records of stage and discharge of streams, and of stage and contents of lakes and reservoirs in the United States during the 1966-70 water years; it contains the records for gaging stations and partial-record stations in the North Atlantic slope basins from New York to Delaware. The daily table for stream-gaging stations gives the mean discharge for each day and is followed by monthly and yearly summaries of total, average, maximum, and minimum discharges. Data for partial-record stations are presented in two tables. The first is a table of discharge measurements at low-flow partial-record stations, and the second is a table annual maximum stage and discharge at crest-stage stations. For most gaging stations on lakes and reservoirs the data comprise a description of the station and a monthly summary table of stage and contents. For some reservoirs a table showing daily contents or stage is given. (Woodard-USGS)
W77-02980

SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70: PART 11. PACIFIC SLOPE BASINS IN CALIFORNIA--VOLUME 3. SOUTHERN CENTRAL VALLEY BASINS.
Geological Survey, Reston, Va. Water Resources Div.
Available from Supt. of Documents, GPO, Wash., D.C. 20402, price $5.25. Water-Supply Paper 2130, 1976. 670 p, 9 fig.

Descriptors: *Hydrologic data, *Surface waters, *Streamflow, *Lakes, *California, Basic data collections, Runoff, Discharge(Water), Gaging stations, Flow measurement, Flow rates, Average flow, Reservoirs, Reservoir stages.
Identifiers: *Pacific slope basins(Calif), Maximum discharges, Minimum discharges, Reservoir content.

This is one of 37 reports presenting records of stage and discharge of streams, and of stage and contents of lakes and reservoirs in the United States during the 1966-70 water years; it contains the records for gaging stations and partial-record stations in the Pacific slope basins in California, Southern Central Valley. The daily table for stream-gaging stations gives the mean discharge for each day and is followed by monthly and yearly summaries of total, average, maximum, and minimum discharges. Data for partial-record stations are presented in two tables. The first is a table of discharge measurements at low-flow partial-record stations, and the second is a table of annual maximum stage and discharge at crest-stage stations. For most gaging stations on lakes and reservoirs the data comprise a description of the station and a monthly summary table of stage and contents. For some reservoirs a table showing daily contents or stage is given. (Woodard-USGS)
W77-02981

WATER-RESOURCES DATA FOR DEEP AQUIFERS ON EASTERN MONTANA,
Geological Survey, Helena, Mont. Water Resources Div.
W. B. Hopkins.
Water-Resources Investigation 76-40 (open-file report), June 1976. 37 p, 6 fig, 5 tab, 64 ref.

Descriptors: *Groundwater resources, *Groundwater availability, *Water quality, *Deep wells, *Montana, Data collections, Water yield, Chemical analysis, Water wells, Aquifer characteristics.
Identifiers: *Eastern Montana groundwater.

Water from aquifers of Mesozoic and Paleozoic age in eastern Montana is little used. This report presents maps and tables to assist in the evaluation of the water in terms of possible utility. In the southern third of eastern Montana water from the Madison Group or from the Tensleep Sandstone contains less than 2,000 milligrams per liter dissolved solids and is available in amounts of as much as 3,700 gallons per minute (230 liters per second) from individual wells. Elsewhere, dissolved-solids concentrations of water from Mesozoic and Paleozoic aquifers commonly exceed 1,000 milligrams per liter, well yields range from 5 to about 1,500 gallons per minute (0.3 to 95 liters per second), and well depths generally are greater than 1,500 feet (460 meters). (Woodard-USGS)
W77-02985

DISCHARGE COMPUTATIONS AT RIVER CONTROL STRUCTURES,
Geological Survey, Jackson, Miss. Water Resources Div.
For primary bibliographic entry see Field 4A.
W77-02986

INDEX TO WATER RESOURCES DATA FOR ILLINOIS,
Geological Survey, Champaign, Ill. Water Resources Div.
D. E. Winget.
Water-Resources Investigations 76-87 (open-file report), 1976. 81 p, 4 tab.

Descriptors: *Water resources, *Hydrologic data, Surface waters, *Groundwater, *Illinois, *Indexing, Sampling, Sites, Data collections, Water quality, Sediment transport, Streamflow, Low flow, Gaging stations, Drainage area, Floods.

This index to water resources data for Illinois includes 1,275 sites where surface-water and ground-water data were collected through December 31, 1975. The index is the first comprehensive tabulation of data collected in Illinois by the U.S. Geological Survey; data collection began in 1903. Information included are the county code, drainage area, datum, type of data available, period of record, where data are filed, and the name of the current cooperating agency. The surface-water index is listed sequentially by station number and also alphabetically by station name. Station numbers for the ground-water index are grouped by counties. The hydrologic unit index shows all sites and is listed by the respective hydrologic boundaries. (Woodard-USGS)
W77-02990

DIGITAL GROUND-WATER MODEL OF THE OGALLALA AQUIFER IN PARTS OF WASHINGTON AND YUMA COUNTIES, NORTHERN HIGH PLAINS OF COLORADO,
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-02991

ANALYSIS OF NONPOINT-SOURCE POLLUTANTS IN THE MISSOURI BASIN REGION,
Midwest Research Inst., Kansas City, Mo.
For primary bibliographic entry see Field 5B.
W77-03013

DETERMINATION OF ESTIMATED MEAN MINE WATER QUANTITY AND QUALITY FROM IMPERFECT DATA AND HISTORICAL RECORDS.
Environmental Quality Systems, Inc., Rockville, Md.
For primary bibliographic entry see Field 5B.
W77-03014

COLORADO RIVER BASIN PILOT PROJECT, COMPREHENSIVE EVALUATION REPORT, FIVE WINTER SEASONS 1970-71 TO 1974-75,
Aerometric Research Inc., Goleta, Calif.
For primary bibliographic entry see Field 3B.
W77-03060

8. ENGINEERING WORKS

8A. Structures

DEVELOPMENT OF NAVIGATION WITH LOCKS AND DAMS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02943

8B. Hydraulics

DELAWARE'S CHANGING SHORELINE,
Delaware Univ., Newark. Dept. of Geology.
For primary bibliographic entry see Field 2L.
W77-02684

HYDRODYNAMICS-DISPERSION STUDIES IN STORM SEWERS,
Rutgers - The State Univ., New Brunswick, N. J. Dept. of Civil and Environmental Engineering.
A. M. Oguntuase, and E. L. Bourodimos.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 990, Price codes: A12 in paper copy, A01 in microfiche. Rutgers University, Water Resources Research Institute, Completion Report, September 1976. 236 p, 33 fig, 22 tab, 133 ref, append. OWRT A-032-NJ(1).

Descriptors: *Storm drains, Turbulence, Equations, *Open channel flows, Sewers, Hydrodynamics, *Diffusion, *Dispersion, *Turbulent flows, *Mathematicl models, Numerical analysis, Velocity, *Computer models, *Simulation analysis, Model studies.
Identifiers: Sewer flow, *Dispersion-diffusion coefficients, Turbulent diffusion, Finite difference equations, *Mass transport equations.

The objective was to simulate through mathematical modeling and laboratory experimentation, the hydrodynamics of diffusion-dispersion processes in partially-full pipe flows descriptive of sewer flows. Equations of motion and species balance-mass transport were derived with boundary conditions applicable to free surface flows in circular pipes. Turbulent flow momentum equation was solved by a modified successive approximation (SOR) numerical technique for steady flow conditions to obtain the velocity profiles, through which turbulent diffusion coefficients were estimated. Species mass transport equations were solved numerically in the three-dimensional cases of longitudinal convection with lateral and vertical diffusion. Laboratory measurements in an experimental flume were taken to provide data for verification and comparison with the theoretical predictions. The developed computer simulation model provides adequate estimates of values of longitudinal dispersion coefficients suitable for circular open channel and sewer flow analysis, design and pollution assessment and control.
W77-02827

HYDRAULIC CHARACTERISTICS OF RIGOLETS PASS, LOUISIANA, HURRICANE SURGE CONTROL STRUCTURES; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
R. C. Berger, Jr, and R. A. Boland ,Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A031

756, Price codes: A05 in paper copy, A01 in microfiche. Technical Report H-76-16, September 1976. 92 p, 10 fig, 28 tab, 12 photo, 25 plates, append.

Descriptors: *Control structures, *Hydraulic models, *Steady flow, *Currents(Water), *Louisiana, Model studies.
Identifiers: *Lake Pontchartrain(La).

The Rigolets model was a fixed-bed model constructed to undistorted linear scale ratios of 1:100 horizontally and 1:100 vertically. The region reproduced by the model is 3.2 miles of the Rigolets, starting at the Lake Pontchartrain entrance of the Rigolets. The model was equipped with the necessary appurtenances for reproduction of steady-state flow in both ebb and flood directions and accurate measurement of water-surface elevations and currents under this condition. Verification tests were conducted to make certain that the model hydraulic regimen agreed with that of the prototype. The agreement attained between water-surface elevations and current velocities from similar model and prototype conditions was considered satisfactory. The testing program consisted of water-surface elevations, current velocities, and surface current patterns for various control structure plans. Possible scouring problems near the Fort Pike State Monument were noticed during testing of plans 2, 2A, and 2B. To remedy this situation the structure was shifted 250 ft away from the Fort Pike bank of the Rigolets Pass. Additional data which were taken for each test plan in the navigation canal with the lock open are presented in Appendix A. (WES)
W77-02932

NUMERICAL MODELING OF RESONANT OSCILLATIONS IN DEEP DRAFT HARBORS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
J. R. Houston.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A028 051, Price codes: A04 in paper copy, A01 in microfiche. Research Report H-76-1, July 1976. 59 p, 6 fig, 23 pl, 23 ref.

Descriptors: *Finite element analysis, *Mathematical models, *Harbors, *Waves(Water), *Numerical analysis, Model studies, *Hydraulic models.

An investigation was undertaken to evaluate numerical models that can be used to predict harbor response to long-period wave excitation for both conventional harbors with deep drafts and artificial offshore ports in deep water. Numerical models using finite difference, hybrid finite element, and Lee's method solutions are discussed and compared with analytical solutions, hydraulic model data, and prototype field data. The hybrid finite element method of solution is shown to adequately predict periods of resonant peaks and model water-surface elevation patterns in conventional and offshore harbors. Computational time requirements of this numerical model are shown to be sufficiently low to make resonant response calculations economically feasible for a wide range of incident wave periods. Use of the hybrid finite element method to evaluate deep draft harbor design or modification and to aid hydraulic model studies of harbor oscillations is discussed. (WES)
W77-02935

U.S. ARMY CORPS OF ENGINEERS FOURTH HYDROGRAPHIC SURVEY CONFERENCE, 5-6 NOVEMBER 1975,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
E. D. Hart, and G. C. Downing.
March 1976. 121 p, 7 fig, 10 photo, 5 append.

Descriptors: *Hydrograph analysis, *Hydrographs, *Hydrography, Hydraulics, *Conferences, Surveys, Information exchange.
Identifiers: *Hydrographic surveys.

Conference held in New Orleans, 5-6 Nov. 1975, for the purpose of exchanging ideas, methods, and experiences of CE surveying personnel. The following papers were presented: The Buffalo District's Small Boat Integrated Hydrographic Surveying and Positioning System, by J. LaFountain. Review of the Corps Hydrographic Survey Study Program, by E. D. Hart, Surveys of Wicomico River, by R. A. Pruhs. Teledyne Integrated Electronic Positioning System, by C. E. Weddle. Del-Norte-Autocarta X Hydrographic Survey System, by J. Bechly. A Simultaneous Evaluation of Motorola and Cubic Hydrographic Survey Systems, by J. T. Long. Hydrography in the Arctic, by E. Brown. The Automation of Soundings in the Rijkswaterstaat (The Netherlands), by D. J. Bakker, and others. (WES)
W77-02937

MODEL MATERIALS EVALUATION SAND TESTS; HYDRAULIC LABORATORY INVESTIGATION,
Coastal Engineering Research Center, Fort Belvoir, Va., and Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8G.
W77-02938

COOPER RIVER REDIVERSION PROJECT, BUSHY PARK WATER SUPPLY TESTS; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
H. A. Benson, and W. H. Bobb.
Available from the National Technical Information Service, Springfield, Va. 22161, Price codes: A08 in paper copy, A01 in microfiche. Miscellaneous Paper H-76-5, March 1976. 168 p, 4 fig, 48 tab, 94 pl.

Descriptors: *Hydraulic models, *Rivers, *Diversion, *Water quality, *Water supply, Model studies, *South Carolina, *Saline water intrusion.
Identifiers: *Charleston Harbor(SC), Cooper River(SC).

The Charleston Harbor model reproduced the Ashley, Cooper, and Wando Rivers, and a portion of the Atlantic Ocean. The model was of fixed-bed construction and was equipped with all the necessary appurtenances for accurate reproduction and measurement of tides, tidal currents, salinity intrusion, and other significant phenomena of the prototype. Hydraulic and salinity tests were made for six weekly release schedules from the Pinopolis power plant. The results of the six tests indicated that, due to redivision, tide levels in the upper Cooper River, Back River Reservoir, and the East Branch of the Cooper River were lowered by amounts between about 0.3 ft and 2.0 ft. Tides at stations in lower Cooper River, the Wando River, and the Ashley River were relatively unchanged. Surface and bottom ebb predominance was decreased drastically in the upper reaches of Cooper River, and was more nearly balanced throughout the length of Cooper River for rediversion conditions than for existing conditions. The degree of salinity stratification was significantly reduced throughout the system for rediversion conditions. (WES)
W77-02939

STABILITY OF RUBBLE-MOUND BREAKWATER LAHAINA HARBOR, HAWAII; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
R. D. Carver.
Available from the National Technical Information Service, Springfield, Va. 22161 as AD/A-024 773, Price codes: A03 in paper copy, A01 in microfiche. Miscellaneous Paper H-76-8, April 1976. 31 p, 2 fig, 1 tab, 6 photo, 8 plates, 1 ref, append.

Descriptors: *Breakwaters, *Hydraulic models, *Hawaii, *Harbors, Model studies.
Identifiers: *Rubble-mound breakwaters, Lahaina Harbor(Hawaii).

A hydraulic model study was conducted to investigate the adequacy of two breakwater sections proposed for Lahaina Harbor, Hawaii. The purpose of the study was to determine (a) the stability of the structure when attacked by the largest waves which may occur in the area, (b) the amount of wave overtopping occurring for the most severe wave condition, and (c) the magnitude of transmitted wave heights associated with a selected range of incident wave conditions. All test were conducted in a 5-ft-wide, 4-ft-deep, and 119-ft-long concrete wave flume at an undistorted linear scale of 1:22 model to prototype. It was concluded that both proposed breakwater sections will (a) maintain their structural integrity, (b) meet the nonovertopping criteria, and (c) prevent excessive wave energy transmission through the breakwater. (WES)
W77-02940

FALLS LAKE WATER-QUALITY STUDY HYDRAULIC LABORATORY INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 5B.
W77-02941

A VARIATIONAL APPROACH TO NONLINEAR WAVE THEORY,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
R. W. Whalin.
Miscellaneous Paper H-76-16, August 1976. 43 p, tab, 3 ref, append.

Descriptors: *Waves(Water), Variability, Theoretical studies, Equations, *Movement
Identifiers: *Wave reflection, Nonlinear wave theory, Equations of motion(Waves).

A variational approach to nonlinear wave theory explored by deriving the equations of motion f four sm all amplitude constant depth theories, tw finite amplitude constant depth theories, and o small amplitude variable depth theory. It is dete mined that the rotational wave theories derived more appealing than the irrotational theories. T characteristic relation is explored for the abo theories and the effect of vertical velocity on wa reflection is investigated. Further numerical a experimental efforts are warranted to investiga the validity of the equations of motion for descri ing shallow water wave phenomena. Although t methodology used requires conservation of en gy, the possibility exists that a variational a proach might be derived for a nonconservati system (thus allowing frictional energy dissipati and energy loss by breaking). (WES)
W77-02942

DEVELOPMENT OF NAVIGATION WI LOCKS AND DAMS,
Army Engineer Waterways Experiment Statio Vicksburg, Miss.
J. J. Franco.
Available from the National Technical Inform tion Service, Springfield, Va. 22161 as AD/A-0 355, Price codes: A04 in paper copy, A01 microfiche. Miscellaneous Paper H-76-15, Ju 1976. 48 p, 9 fig, 10 ref, append.

Descriptors: *Dams, *Cofferdams, *Loc *Navigation, Rivers, Shoals, Barges.

The need for locks and dams for the developm of navigation on some streams and the proble that could be encountered are discussed in this port. Satisfactory navigation conditions depend the site selected, characteristics of the strea

ntation and arrangement of the structure and
ted facilities, and type of traffic anticipated.
vs approaching the locks could be affected by
erse currents that could be hazardous or cause
ays. The lock arrangement should consider the
rents to be caused by the completed structure
the effects of these currents on the movement
ows. Model studies can be invaluable in deter-
ing the adequacy of a proposed structure and
ifications required to eliminate any undesira-
conditions. New concepts in lock arrange-
nts should be considered to improve safety and
ciency. Shoaling in the lock approaches can
sent serious problems but can be eliminated or
imized with special structures. Cofferdam
s should consider maintenance of navigation
ng construction and the effect of scour on its
ility. Deflectors can be used to move the scour
away from the main cofferdam. (WES)
7-02943

IMATION OF WINDS OVER THE GREAT KES,
y Engineer Waterways Experiment Station,
ksburg, Miss.
primary bibliographic entry see Field 2H.
7-02944

NSMISSION OF WAVE ENERGY ROUGH AND OVERTOPPING OF THE NG BEACH, CALIFORNIA, BREAKWATER; DRAULIC MODEL INVESTIGATION,
y Engineer Waterways Experiment Station,
ksburg, Miss.
. Hales.
ilable from the National Technical Informa-
Service, Springfield, Va. 22161 as AD/A-025
Price codes: A04 in paper copy, A01 in
rofiche. Miscellaneous Paper H-76-10, May
. 60 p 13 fig, 11 tab, 8 ref, 2 append.

criptors: *Breakwaters, *Hydraulic models,
ves(Water), Model studies, *California,
rbors.
tifiers: *Long Beach Harbor(Calif), *Los An-
s Harbor(Calif), Wave transmission.

rder to meet growing future demands, a 10- to
r harbor expansion program for the ports of
Angeles and Long Beach, Calif., has been
gned to provide an increased amount of ter-
l space and berthing areas. This increased
e will be developed by dredging and landfill
truction in the Outer Harbor, leaving a 1,000-
ide channel between the breakwater and the
fill. As part of the U.S. Army Engineer spon-
d study of the Los Angeles-Long Beach Har-
complex, deepwater wave characteriistics ap-
ching the area were propagated numerically
shallow water (to the breakwater) and the ef-
of refraction and shoaling were determined.
transmission coefficient obtained from this
rimental study then were applied to these
and estimations of the magnitude and dura-
of specific waves occurring in the channel
developed. (WES)
-02945

SIBILITY OF MONITORING FLOW PAT-NS AND SEDIMENT AND POLLUTANT 'ERSION OF WATER BODIES WITH 24-NNEL SPECTRAL DATA,
y Engineer Waterways Experiment Station,
sburg, Miss.
primary bibliographic entry see Field 5B.
-02946

ECTS OF 40-FOOT CHARLESTON HAR-PROJECT ON TIDES, CURRENTS AND NITIES; HYDRAULIC MODEL IN-TIGATION,
y Engineer Waterways Experiment Station,
sburg, Miss.
Benson.

Available from the National Technical Information Service, Springfield, VA 22161 as AD-A024 524, Price codes: A09 in paper copy, A01 in microfiche. Miscellaneous Paper H-76-9, May 1976. 185 p, 4 fig, 70 tab, 88 pl.

Descriptors: *Hydraulic models, *Navigation, *Salinity, *Tides, *Currents(Water), Model studies, *South Carolina, Harbors.
Identifiers: *Charleston Harbor(SC).

The Charleston Harbor Model reproduced the Ashley, Cooper, and Wando Rivers and a portion of the Atlantic Ocean. The model was of fixed-bed construction and was equipped with all the necessary appurtenances for accurate reproduction and measurement of tides, tidal currents, salinity intrusion, and other significant phenomena of the prototype. The results of tests for existing flows in the Cooper River indicated that: (a) The maximum changes in tide range and levels were 0.2 ft in portions of the estuary. (b) The probable area of heavy shoaling near the upstream end of the Federal channel in the Cooper River was shifted upstream and may be more concentrated at the upper end; (c) an increase in shoal material moving into the Ashley River probably will occur; (d) the Wando River shoaling potential was not changed; (e) the limit of intrusion of salt water (100 ppm) in the Cooper River was shifted from about 25.0 to about mile 27.5; and (f) the salinity conditions in the Ashley River, Wando River, and Clouter Creek were increased 2 to 3 ppt. (WES)
W77-02947

NUMERICAL ANALYSIS OF TIDAL CIRCULATION FOR LONG BEACH HARBOR; REPORT 1, EXISTING CONDITIONS AND ALTERNATE PLANS FOR PIER J COMPLETION AND TANKER TERMINAL STUDY,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
D. C. Raney.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A031 174, Price codes: A07 in paper copy, A01 in microfiche. Miscellaneous Paper H-76-4, September 1976 (Report 1 of a series). 140 p, 14 fig, 3 tab, 102 pl, 4 ref, append.

Descriptors: *Harbors, *Numerical analysis, *Piers, *Tides, *California, *Numerical analysis, Model studies.
Identifiers: *Tidal currents, *Tanker terminals, *Long Beach Harbor(Calif).

A study was conducted for Long Beach Harbor to numerically investigate tidal circulation in existing basins and to define and evaluate the impact of possible modification of Pier J on existing harbor circulation. A two-dimensional depth-averaged formulation of the hydrodynamic equations was used in the model and an implicit-explicit finite difference scheme was used to numerically solve the equations. The numerical model was verified using tide and velocity data from the prototype and from physical model tests conducted at WES. For each Pier J modification considered, overall tidal circulation patterns were obtained hourly by vector plots of the tidal velocity at each finite difference cell. The change in overall tidal circulation patterns from those presently existing were also determined. The mass flow rates through the breakwater openings and channels were calculated and compared with those flows currently existing in the harbor. Changes in flow rates as a result of the Pier J modification were identified. (WES)
W77-02948

NUMERICAL ANALYSIS OF TIDAL CIRCULATION FOR LONG BEACH HARBOR; REPORT 3, EXISTING CONDITIONS AND ALTERNATE PLANS FOR PIER J COMPLETION AND TANKER TERMINAL STUDY WITH -82 FT CHANNEL,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
D. C. Raney.
Available from the National Technical Information Service, Springfield VA 22161 as AD-A031 178, Price codes: A07 in paper copy, A01 in microfiche. Miscellaneous Paper H-76-4, September 1976 (Report 3 of a series). 141 p, 14 fig, 3 tab, 102 pl, 6 ref, append.

Descriptors: *Harbors, *Numerical analysis, *Piers, *Tides, *California, Model studies.
Identifiers: *Tidal currents, *Tanker terminals, *Long Beach Harbor(Calif).

A study was conducted for Long Beach Harbor to numerically investigate tidal circulation in existing basins and to define and evaluate the impact of possible modification of Pier J on existing harbor circulation. A two-dimensional depth-averaged formulation of the hydrodynamic equations was used in the model and an implicit-explicit finite difference scheme was used to numerically solve the equations. The numerical model was verified using tide and velocity data from the prototype and from physical model tests conducted at WES. For each Pier J modification considered, overall tidal circulation patterns were obtained hourly by vector plots of the tidal velocity at each finite difference cell. The change in overall tidal circulation patterns from those presently existing were also determined. The mass flow rates through the breakwater openings and channels were calculated and compared with those flows currently existing in the harbor. Changes in flow rates as a result of the Pier J modification were identified. (WES)
W77-02949

LONG BEACH HARBOR NUMERICAL ANALYSIS OF HARBOR OSCILLATIONS; REPORT 1, EXISTING CONDITIONS AND PROPOSED IMPROVEMENTS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
J. R. Houston.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A031 171, Price codes: A08 in paper copy, A01 in microfiche. Miscellaneous Paper H-76-20, September 1976 (Report 1 of a series). 194 p, 1 fig, 5 tab, 161 pl, 11 ref, append.

Descriptors: *Finite element analysis, *Harbors, *Numerical analysis, *California, *Model studies, Hydraulic models.
Identifiers: *Long Beach Harbor(Calif), Harbor oscillations.

A hybrid finite element numerical model was used to calculate harbor resonance for existing conditions and proposed improvements of Los Angeles and Long Beach Harbors. The numerical model calculates harbor oscillation for harbors of arbitrary shape and variable depth. Ten finite element numerical grids were used to calculate the response of the harbors complex for incident waves with periods from 1 to 10 min. Calculations of the model for existing conditions of the harbors were shown to be in good agreement with prototype measurements. The numerical model calculations indicate that resonant oscillations in existing harbor facilities will not be radically altered by the proposed modifications of the harbors complex. The resonant oscillations are, in general, somewhat smaller for the modified conditions of the harbors complex than for existing conditions. (WES)
W77-02950

LONG BEACH HARBOR NUMERICAL ANALYSIS OF HARBOR OSCILLATIONS; REPORT 3, ALTERNATE PLANS FOR PIER J COMPLETION AND TANKER TERMINAL PROJECT (62- AND 82-FT DEPTHS),
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
J. R. Houston.

Available from the National Technical Information Service, Springfield, VA 22161 as AD-A031 173, Price codes: A04 in paper copy, A01 in microfiche. Miscellaneous Paper H-76-20, September 1976 (Report 3 of a series). 61 p, 47 plates, append.

Descriptors: *Finite element analysis, *Numerical analysis, *Harbors, *Mathematical models, *Piers, *California, Model studies.
Identifiers: Tanker terminals, *Harbor oscillations, *Long Beach Harbor(Calif).

A hybrid finite element numerical model was used to calculate harbor response for three alternate geometrical plans and two water depths for the Pier J completion and tanker terminal project of Long Beach Harbor. The numerical model calculates harbor oscillation for harbors of arbitrary shape and variable depth. Three finite element grids which covered areas only in the immediate vicinity of the breakwater-protected tanker terminal area were used to calculate the response of this area to incident waves with periods from 30 sec to approximately 6 min. (WES)
W77-02951

DESIGN FOR WAVE PROTECTION, FLOOD CONTROL, AND PREVENTION OF SHOALING, CATTARAUGUS CREEK HARBOR, NEW YORK; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
R. R. Bottin, Jr, and C. E. Chatham, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A019 024, Price codes: A07 in paper copy, A01 in microfiche. Technical Report H-75-18, November 1975. 144 p, 4 fig, 23 tab, 73 photo, 30 plates, 19 ref, append.

Descriptors: *Breakwaters, *Channel improvement, *Flood control, *Harbors, *Hydraulic models, *Shoals, *Waves(Water), *New York.
Identifiers: *Cattaraugus Creek Harbor(NY).

A 1:75-scale undistorted hydraulic model of the lower 5400 ft of Cattaraugus Creek and sufficient offshore area in Lake Erie to permit generation of the required test waves was used to investigate the arrangement and design of certain proposed improvements with respect to shoaling, wave protection, and flood control. The proposed improvement plans consisted of (a) breakwaters in Lake Erie at the mouth of Cattaraugus Creek, aggregating about 2300 ft in length; (b) a berm, about 700 ft in length, extending northward from the inner end of the north breakwater to high ground; (c) a 120-ft-wide, 8-ft-deep entrance channel, about 1900 ft in length, extending from the 8-ft contour in the lake to the maneuvering area; (d) a 6-ft-deep maneuvering area 300 ft wide by 600 ft long; (e) a 120-ft-wide, 6-ft-deep channel, extending upstream approximately 1900 ft from the maneuvering area; (f) a riprapped friction section extending about 750 ft upstream from the navigation channel through the New York Central Railroad bridge; (g) two levees on the left bank aggregating about 770 ft in length; and (h) development of recreational facilities. (WES)
W77-02952

ICE FLUSHING FROM ST. LAWRENCE SEAWAY LOCKS; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
N. R. Oswalt.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A028 021, Price codes: A03 in paper copy, A01 in microfiche. Technical Report H-76-9, July 1976. 45 p, 4 fig, 10 photos, 9 plates.

Descriptors: *Hydraulic models, *Ice, *Ice jams, Rivers, Lakes, *Locks, *St. Lawrence Seaway, Model studies.

The St. Lawrence Seaway Development Corporation secured the service of the U.S. Army Engineer Waterways Experiment Station to determine, with the aid of physical model tests, the most effective and economical method of ridding a lock chamber of floating ice. Tests were conducted in an existing 1:25-scale lock model modified to simulate the pertinent features of the St. Lawrence Seaway Lock chambers. A manifold at the upstream end of the chamber proved best for flushing ice from the chamber. Flow through the manifold was pumped from various locations in the chamber or piped through the upstream miter gate sill; both of these methods were designed to create a sufficient slope of the water surface in the chamber to flush the ice. These model tests provided the means to determine the size and configuration of the manifold and the amount of flow required for total flushing. The concept of pumping water to an upstream manifold from the lower end of the chamber was tested with limited success. Optimum flushing of the surface ice was accomplished with four 4-ft-diam pipes spaced 16 ft apart between the lock walls with their center line level with the lower pool. A total discharge of 2000 cfs was required for optimum flushing. (WES)
W77-02953

LOS ANGELES AND LONG BEACH HARBORS MODEL STUDY; REPORT 3, ANALYSES OF WAVE AND SHIP MOTION DATA,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
D. L. Durham, J. K. Thompson, D. G. Outlaw, and L. G. Crosby.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A016 904, Price codes: A09 in paper copy, A01 in microfiche. Technical Report H-75-4, July 1976 (Report 3 of a series). 460 p, 4 fig, 54 tab, 37 plates, 34 ref, 9 append.

Descriptors: *Waves(Water), *Harbors, *California, *Model studies.
Identifiers: *Long Beach Harbor(Calif), *Los Angeles Harbor(Calif), *Ship motion data, *Tidal currents, Harbor oscillations.

This report describes the procedures and presents the results of analyses of prototype ship motion and wave data collected in the Los Angeles and Long Beach Harbors during a 1-yr data acquisition program. The wave data were collected by the U.S. Army Engineer Waterways Experiment Station (WES) and the ship motion data were obtained by personnel of the Ports of Los Angeles and Long Beach under the direction of the U.S. Army Engineer District, Los Angeles. All analyses of these data were performed by WES. The model study has four major objectives: (a) To determine incidence and severity of troublesome oscillations in the present harbor complex, (b) to investigate tidal circulation characteristics of the present and proposed harbors, (c) to determine the optimum plan for future expansions to provide safe and economical berthing areas, and (d) to analyze the effects of proposed expansions on the existing harbors. (WES)
W77-02955

TIOGA OUTLET WORKS, TIOGA AND HAMMOND LAKES, SUSQUEHANNA RIVER BASIN, PENNSYLVANIA; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
N. R. Oswalt.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A026 262, Price codes: A03 in paper copy, A01 in microfiche. Technical Report H-76-5, April 1976. 36 p, 7 fig, 8 photo, 9 plates.

Descriptors: *Hydraulic models, *Open chann
flow, *Outlet works, *Riprap, *Stilling basin
Lakes, *Pennsylvania, Model studies
Identifiers: *Tioga Lake(Penn), *Hammon
Lake(Penn), Susquehanna River Basin(Penn).

A 1:25-scale model of the Tioga outlet works w
used to determine the adequacy of the stilli
basin to perform as desired for discharges up
15,860 cfs, to study flow conditions in the e
channel, and to determine minimum ripr
requirements for the exit channel. A schematic
the intake tower, the outlet conduit, the stilli
basin, and about 600 ft of the exit channel we
reproduced in the model. The original desi
stilling basin performed satisfactorily f
discharges ranging from 2,000 to 14,000 cfs, ho
ever, flow separation and adverse vortex act
occurred with lesser flows and a pulsating jur
that overtopped the basin walls occurred w
greater flows. Performance with low release ra
was determined for both single- and double-ga
operations. Recommended changes to the origi
design stilling basin included widening the ba
from 55.5 to 72 ft, decreasing the flare of the ou
transition from 1 on 4.683 to 1 on 6, raising
basin apron 4.5 ft from el 1005.5 to 1010.0, rais
the elevation of the sidewalls from 1043.0
1048.0, and lengthening the basin approximately
ft to the 38.64-ft-long horizontal floor at the ou
portal. The minimum size riprap required for s
bility in the exit channel was determined with
design discharge of 15,860 cfs. (WES)
W77-02956

**IMPROVEMENTS FOR MASONBORO INL
NORTH CAROLINA; HYDRAULIC MODEL
VESTIGATION,**
Army Engineer Waterways Experiment Stati
Vicksburg, Miss.
W. C. Seabergh
Available from the National Technical Infor
tion Service, Springfield, VA 22161 as ADA-
434, Price codes: A07 in paper copy, A01
microfiche. Technical Report H-76-4, April 197
vol) 416 p, 42 fig, 2 tab, 197 photo, 129 plate
ref, append.

Descriptors: *Channels, *Channel improveme
*Hydraulic models, *Jetties, *Shoaling, *N
Carolina, Model studies.
Identifiers: *Masonboro Inlet(NC), Tidal inlets

The Masonboro Inlet fixed-bed model was c
structed of concrete to scales of 1:300 horizont
and 1:60 vertically. The model reproduced an a
extending to the -45 ft contour in the Atla
Ocean and to the extent of the influence of
inlet in the bay. The wetlands were accura
reproduced near the inlet, but those relatively
areas farther bayward were reproduced schem
cally and artificially bent into the research fl
to provide storage for the tidal prism. Model ve
cation tests assured that the model hydraulic
shoaling regimes were in satisfactory agreem
with the prototype. Preliminary testing inclu
the examination of tidal surface current patt
for various structural configurations, inclu
training structures to deflect currents away f
the north jetty, offshore breakwaters, and var
south jetty alignments. This testing indicated
construction of south jetty would aid in maint
ing a channel more centrally located between
jetties, away from the north jetty. The const
tion of a deposition basin in Banks Channel
the entrance of the inlet was also investiga
(WES)
W77-02958

**CHUTE SPILLWAY FOR COWANESQUE D
COWANESQUE RIVER, PENNSYLVA
HYDRAULIC MODEL INVESTIGATION,**
Army Engineer Waterways Experiment Sta
Vicksburg, Miss.
B. P. Fletcher.

ilable from the National Technical Informa- Service, Springfield, VA 22161 as ADA-030 Price codes: A04 in paper copy, A01 in rofiche. Technical Report H-76-12, August 5. 53 p, 12 fig, 2 tab, 9 photos, 10 plates.

criptors: *Dams, *Hydraulic models, illways, *Chutes, *Pennsylvania, Model stu-

tifiers: *Cowanesque River(Penn).

ts to investigate the hydraulic performance of chute spillway for Cowanesque Lake were ducted using a 1:60-scale model. Particular hasis was placed on the development of a cture that would convey flow through the e with a minimum of turbulence and waves. v approaching the structure from the left ted a severe flow contraction at the left spill- abutment which became progressively more re as the discharge increased. The flow con- tion generated a standing wave that over- ed the chute sidewall. Flow distribution at the nstream end of the chute was unsymmetrical. ral flow from the left side of the exit area ed to concentrate the jet emerging from the e along the right side of the exit channel, and cities as high as 55 fps were measured. Model indicated that a stilling basin located at the nstream end of the chute would improve the ormance of flow from the chute and in the exit nel. However, due to economic and structural iderations, a stilling basin was not considered ible, and only preliminary stilling basin tests conducted. (WES)
-02959

KLEY LOCK PROTOTYPE TESTS CUM- LAND RIVER, KENTUCKY,
y Engineer Waterways Experiment Station, sburg, Miss.
. Neilson.
lable from the National Technical Informa- Service, Springfield, VA 22161 as ADA-012 Price codes: A06 in paper copy, A01 in ofiche. Technical Report H-75-11, June 1975. 35 fig, 8 tab, 28 plates, 16 ref, append.

riptors: *Locks, *Kentucky, Rivers, Testing edures, Model studies, Performance.
ifiers: *Barkley Lock(Ky), *Cumberland r(Ky).

report presents data obtained during proto- tests concerned with the performance of the by 800-ft lock at Barkley Lock and Dam pro- Cumberland River, Kentucky. Prototype urements are continuous records of the fol- g: (a) Pressures at 22 locations in the lock rt system; (b) valve opening patterns; (c) leaf pressures and accelerations; (d) water- ce oscillations and elevation; (e) hawser s and motion of a nine-barge tow moored in ck; (f) valve-hoist strains and cylinder pres- ; (g) miter gate opening; and (h) air-vent flow The results are compared with a previous l study and include information on (a) proto- instrumentation and testing, (b) basic lock rmance, (c) effects of various valve opening lules on air venting, and (d) the response of a ed tow. The primary conclusions are that the type performance had been, reasonably pre- l in the model study. (WES)
02960

NECTING CHANNEL FOR TIOGA AND MOND LAKES, TIOGA RIVER AND OKED CREEK, PENNSYLVANIA; RAULIC MODEL INVESTIGATION,
Engineer Waterways Experiment Station, burg, Miss.
Oswalt, and G. A. Pickering.
able from the National Technical Informa- Service, Springfield, VA 22161 as ADA-026 Price codes: A03 in paper copy, A01 in fiche. Technical Report H-76-6, April 1976. 5 fig, 13 photo, 12 plates.

Descriptors: *Channels, *Channel improvement, *Hydraulic models, *Open channel flow, *Outlet works, Weirs, *Pennsylvania, Model studies, Lakes.
Identifiers: *Tioga Lake(Penn), *Hammond Lake(Penn).

A channel will be excavated to connect the west side of Tioga Lake with the east side of Hammond Lake to permit the two reservoirs to be operated as one flood-control project. An overflow structure will be used to keep the drainage in Tioga Lake from entering Hammond Lake until storage in Tioga Lake exceeds the weir crest el 1101 ft msl. Normal flows from Hammond Lake to Tioga Lake will be controlled by an outlet works in the structure, and flood flows in this direction will pass over the weir. The model investigation was concerned with the adequacy of the connecting channel and its associated structure. The study was conducted in a 1:80-scale model which reproduced a portion of the Tioga and Hammond reservoirs, the connecting channel including a plunge pool, weir, and outlet works, and the Tioga Lake outlet works in the structure. Concerning flow from Tioga Lake to Hammond Lake, the efficiency of the uncontrolled weir was less than originally anticipated. The plunge pool as originally designed resulted in satisfactory flow conditions for all expected discharges. The model indicated that the uncontrolled weir was more efficient than expected for flow from Hammond Lake to Tioga Lake. Flow conditions were satisfactory for both uncontrolled weir flow and for flows through the outlet works stilling basin. (WES)
W77-02961

GRAYS HARBOR ESTUARY, WASHINGTON, REPORT 6, 45-FT MSL (40-FT MLLW) NAVIGATION CHANNEL IMPROVEMENT STUDIES; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
N. J. Brogdon, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as AD A014 983, Price codes: A05 in paper copy, A01 in microfiche. Technical Report H-72-2, April 1976 (Report 6 of a series). 429 p, 39 fig, 20 tab, 12 photo, 313 plates.

Descriptors: *Channel improvement, *Hydraulic models, *Navigation, *Washington, Model studies, Estuaries, Salinity, Tidal waters.
Identifiers: *Grays Harbor Estuary(Wash), Ebb flow(Estuaries).

The existing, comprehensive fixed-bed model of the Grays Harbor estuary was used to determine the effects of enlarging (deepening and widening) the existing 35-ft-deep channel to a depth of 45 ft msl. One 45-ft improvement plan consisting of 23 groins and a relocated turning/settling basin was also investigated. Model tests were conducted on the above plans to determine effects on tidal heights, current velocities and patterns, salinity intrusion, dye dispersion, and channel shoaling. Some changes caused by the enlarged channel were: (1) Maximum current velocities were reduced by less than 0.5 fps. (2) Bottom ebb flow predominance was decreased along the navigation channel upstream from Crossover Channel. (3) Very littl change occrred in tidal heights or phase of tide. (4) Surface ebb flow predominance was increased along the entire length of the navigation channel. (5) Salinity values in the upper reaches of the estuary were increased, thus increasing upstream intrusion of the salinity wedge. (6) Dye concentrations resulting from a dye release at the bottom in the estuary entrance were increased throughout the estuary. (WES)
W77-02963

NEW TECHNIQUES AND MATERIALS FOR CONSTRUCTING HYDRAULIC MODELS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8G.
W77-02964

EFFECTS OF HURRICANE SURGE BARRIER ON HYDRAULIC ENVIRONMENT, JAMAICA BAY NEW YORK; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
R. F. Athow, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-030 638, Price codes: A12 in paper copy, A01 in microfiche. Technical Report H-76-14, September 1976. 264 p, 16 fig, 32 tab, 26 photo, 147 plates, 6 ref, append.

Descriptors: Hurricanes, *Barriers, Hydraulic models, *Surges, *New York, Model studies.
Identifiers: *Jamaica Bay(NY).

An existing comprehensive physical model that correctly reproduced tides, tidal currents, hurricane surges, and salinity distribution throughout the New York Harbor area and especially the Jamaica Bay complex was used to determine the effects of 13 different hurricane surge barrier plans on the hydraulic environment of Jamaica Bay. The study included tests in the model to determine: (1) The size of the ungated navigation opening that will provide the suppression required inside Jamaica Bay during periods of hurricanes and northeasterly storms; (2) the maximum current velocities in and near the navigation opening that will be experienced by navigation during normal tidal conditions; (3) the effects of the hurricane surge protection structure on tides, tidal currents, salinities, and pollution dispersion patterns within the bay for normal tide conditions; and (4) the minimum area of gated tidal passages required to maintain existing conditions in the bay with respect to salinities and pollution dispersion. (WES)
W77-02966

PROTOTYPE TESTS, OLD RIVER LOW-SILL CONTROL STRUCTURE, APRIL 1973-JUNE 1975,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
F. M. Neilson, and A. R. Tool.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-030 971, Price codes: A06 in paper copy, A01 in microfiche. Technical Report H-76-15, September 1976. 114 p, 38 fig, 8 tab, 23 pl, 20 ref, append.

Descriptors: *Gates, *Hydraulic structures, *Prototype tests, *Vibration, *Louisiana.
Identifiers: *Old River Control Structure(La).

The following four separate series of prototype tests at Old River Low-Sill Control Structure are presented in this report. (1) High-flow vibration tests (4-5 April 1973), comprised of acceleration measurements, were made to determine the magnitude of the vibration of the structure under higher than normal flows. (2) Vibration monitor tests (16 April-1 June 1973), comprised of acceleration measurements, were made during a period in which the structure was not in a structurally sound condition. (3) Demolition tests (16-25 September 1973 and 4-15 November 1974), primarily acceleration measurements (with limited geophone and pressure cell data), were made during a period in which demolition activities (using explosive charges) were taking place near the structure. (4) Low-sill gate load tests (May-June 1975), comprised of measurements of strain, acceleration, load, and temperature, were made to determine the variations in loading that occur in the gate hoist mechanism and in the gate supports

during both typical and nontypical gate operation. Tests are briefly described and a limited sampling of the data is presented. (WES)
W77-02967

RESISTANCE EQUATION FOR ALLUVIAL-CHANNEL FLOW,
Geological Survey, Menlo Park, Calif. Water Resources Div.
D. E. Burkham, and D. R. Dawdy.
Proceedings of ASCE, Journal of the Hydraulics Division, Vol 102, No HY10, Paper 12462, p 1479-1489, October 1976. 3 fig, 1 tab, 19 ref. append.

Descriptors: *Alluvial channels, *Flow resistance, *Sediment transport, *Turbulent flow, *Model studies, Analytical techniques, Equations, Sediment load.

The equation developed by Keulegan for resistance to turbulent flow in uniform rigidboundary conduits can be used (with reasonably accurate results) to represent resistance to turbulent flow in alluvial channels providing that a mathematical correction is made and certain channel conditions exist. The results of this study may be useful in eliminating some of the empiricism that was introduced to reduce bias in the modified Einstein method of computing total sediment load. (Woodard-USGS)
W77-02971

DISCHARGE COMPUTATIONS AT RIVER CONTROL STRUCTURES,
Geological Survey, Jackson, Miss. Water Resources Div.
For primary bibliographic entry see Field 4A.
W77-02986

STRATIFIED FLOW IN GREAT SALT LAKE CULVERT,
Geological Survey, Salt Lake City, Utah. Water Resources Div.
E. R. Holley, and K. M. Waddell.
Proceedings of ASCE, Journal of the Hydraulics Division, Vol 102, No HY7, Paper 12250, p 969-985, July 1976. 7 fig, 2 tab, 13 ref.

Descriptors: *Mixing, *Great Salt Lake, *Culverts, *Stratified flow, *Density currents, Model studies, Numerical analysis, Forecasting, Evaluation, *Utah.
Identifiers: *Great Salt Lake causeway culverts(Utah).

A causeway has effectively divided the Great Salt Lake in Utah into two lakes having different water-surface elevations and different densities. Exchange between the two lakes is by seepage through the causeway and by flow through two culverts. There are three possible flow regimes in the culverts: (1) Single layer; (2) arrested wedge; and (3) two-layer stratified flow. An analytical-numerical model is presented to predict which of the regimes will exist under given conditions to predict the discharges. Stratified flow analyses have normally assumed a horizontal water surface and small density differences. These assumptions are removed. An expanded definition of the densimetric critical conditions is given for large density differences. The model gives acceptable agreement with the 49 sets of field measurements of the culvert discharges. (Woodard-USGS)
W77-02987

CONVECTIVE MODEL OF LONGITUDINAL DISPERSION,
Geological Survey, Jackson, Miss. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-02988

DISPERSION--MISSISSIPPI RIVER BELOW BATON ROUGE, LA.,
Geological Survey, Jackson, Miss. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-02989

8C. Hydraulic Machinery

ICE FLUSHING FROM ST. LAWRENCE SEAWAY LOCKS; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02953

BARKLEY LOCK PROTOTYPE TESTS CUMBERLAND RIVER, KENTUCKY,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W77-02960

8D. Soil Mechanics

STRAIN RATE EFFECT ON THE STRENGTH OF FROZEN SILT,
Cold Regions Research and Engineering Lab., Hanover, N.H.
F. D. Haynes, J. A. Karalius, and J. Kalafut.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-021 981, Price codes: A03 in paper copy, A01 in microfiche. Army Corps of Engineers, Research Report 350, December 1975. 31 p, 23 fig, 4 tab, 16 ref, 3 append.

Descriptors: *Frozen soils, *Permafrost, *Compressive strength, *Tensile strength, Laboratory tests, Silts, Soils, Freezing, Strain measurement, Strength, Mechanical properties, Strength of materials, Strain, Cold regions, Cold weather construction, Soil mechanics.

Uniaxial compression and tension tests were conducted on frozen Fairbanks silt at a temperature of -10C. A relatively stiff testing machine was operated at a constant displacement rate for each test. The tests showed that compressive strength is very sensitive to strain rate and that tensile strength is relatively insensitive to it. The compressive strength increased ten times over a strain rate range of 0.00012/s to 2.9/s. As was found in other investigations, tangent moduli increased slightly with greater strain rates. The specific energy increased at higher strain rates for compression tests and decreased slightly for tension tests. For increased strain rates, uniaxial compression strength showed no tendency to plateau; nor did the specific energy reach a minimum during uniaxial tensile testing. (Sims-ISWS)
W77-02804

8E. Rock Mechanics and Geology

OPTIMIZATION OF WATER RESOURCE SYSTEMS INCORPORATING EARTHQUAKE RISK,
California Univ., Los Angeles. School of Engineering and Applied Science.
For primary bibliographic entry see Field 6A.
W77-02831

8F. Concrete

PERFORMANCE OF LIGNITE AND SUBBIT MINOUS FLY ASH IN CONCRETE - PROGRESS REPORT,
Bureau of Reclamation, Denver, Colo. Engine ing and Research Center.
E. R. Dunstan, Jr.
Report REC-ERC-76-1, January 1976. 23 p, 6 fi tab, 14 ref. 1 append.

Descriptors: *Fly ash, *Concretes, *Lign *Pozzolans, Concrete additives, Air entrainm Concrete mixes, Concrete testing, Ceme Coals, Compressive strength, Freeze-thaw te Elasticity(Mechanical), Deterioration, Shrinka Specifications, Concrete technology, Civil gineering.
Identifiers: Subbituminous coals.

Vast reserves of subbituminous and lignite will be used in power production in the Un States in the years to come. A byproduct, fly collected from the flue gases of coal burn powerplants will be produced in large quanti Since bituminous coal fly ash has been use concrete to considerable advantage for sev years now, it is quite likely that similar use c be made of lignite and subbituminous coal ashes. If so, this material could provide a plent supply of a potentially low cost cementing med for use with portland cement in concrete. ashes were obtained from five western Un States powerplants. A complete chemical physical analysis of each lignite and subb minous ash was made, and none was found meet all requirements for a Class F pozzolan cording to Federal Specification SS-P-5 Concrete mixes were made with 15 and replacement of cement, by weight, with these ashes and compared to a mix containing no fly and to mixes containing 15 and 25% replacem of fly ash meeting the requirements for a Cla pozzolan. The resulting hardened concrete found to have adequate compressive stren reduced drying shrinkage, and satisfactory fre thaw durability, but, in some cases, drastic reduced resistance to sulfate attach. (Sims-ISW
W77-02803

8G. Materials

CORROSION OF SELECTED MATERIALS LAKE MEAD WATER,
Nevada Univ., Reno. Desert Research Inst
M. L. Miles, R. A. Huening, S. E. Green, and F Dewey.
Available from the National Technical Info tion Service, Springfield, VA 22161 as PB-261 Price codes: A03 in paper copy, A01 in microfi Water Resources Center, Project Report No December 1976. 26 p, 2 fig, 8 tab, 6 ref, 2 app OWRT A-069-NEV(1). 14-31-00016029.

Descriptors: *Corrosion, Materials testing, La *Nevada, *Colorado River, *Corrosion con Aluminum, Alloys, Iron, Steel, Metals, Cop Nickel, Oxidation, Rusting, Storage.
Identifiers: *Lake Mead(Nevada), *Corro rates.

Users of Colorado River water from Lake M are plagued with severe corrosion problems. pipes in distribution lines and in homes have duration. Brass plumbing fixtures suffer rapi zincification resulting in grooved and leaky fa seats, connectors to hot water heaters fail rap service entrance lines are soon plugged, etc. study was designed to measure the corrosion of materials used in systems treating and distr ing water from lake Mead; and test available h less treatments that might reduce the corro properties of this water supply. Corrosive at of Colorado River water stored in Lake Me generally proportional to its velocity of co

ith aluminum, red brass, phosphorus bronze, sil-
on bronze, copper, Monel and Naval brass. Cor-
sion rate of alloys of copper, nickel and iron is
lated to the gases dissolved in the water.
emovel of oxygen and other gases by nitrogen
ripping generally reduced the corrosion rate of
uminum, silicon brass, Monel, silicon bronze
d stainless steel. The corrosive rate of Colorado
ver water stored in Lake Mead on iron and steel
increased in porportion to (1) the availability of
ygen at the metal surface and (2) the velocity
d acceleration either linear or directional of the
id contact. (Fallon-Nevada)
77-02832

ODEL MATERIALS EVALUATION SAND ESTS; HYDRAULIC LABORATORY IN-ESTIGATION,
astal Engineering Research Center, Fort
lvoir, Va., and Army Engineer Waterways Ex-
riment Station, Vicksburg, Miss.
C. McNair, Jr.
vailable from the National Technical Informa-
n Service, Springfield, Va 22161 as AD-746 972,
ice codes: A12 in paper copy, A01 in microfiche.
neral Investigation of Tidal Inlets (GITI) Report
June 1976. 270 p, 20 fig, 11 tab, 5 photo, 196 p1,
ref, append.

scriptors: *Hydraulic models, *Sands,
ediment transport, Model studies, *Materials
ting.
ntifiers: Tidal inlets.

laboratory investigation was performed to
fine responses of a natural quartz sand to vari-
s hydraulic conditions. The results demonstrate
performance of the material in a movable-bed
del and, when compared with the responses of
er materials, may provide a basis for the selec-
n of optimum materials for various movable-
d modeling requirements. Twenty-one tests
re performed with a 40-ft-long beach containing
inlet and with unidirectional, steady flows
ough the inlet substituting for tidal flows. The
ometric characteristics of the inlet channel,
ach profiles, inlet configurations, and material
nsport were observed for conditions with and
hout waves and for various magnitudes of flood
d ebb flows. The tests showed that the minimum
nnel area, the channel width at the location of
minimum area, and the hydraulic radius at the
ation of the minimum area were strongly re-
ed to the rate of flow through the channel. The
e of material transport was found to be weakly
ated to channel flow rate, but the sparseness of
a observations with time precluded definite
luation of this. (WES)
7-02938

W TECHNIQUES AND MATERIALS FOR NSTRUCTING HYDRAULIC MODELS,
ny Engineer Waterways Experiment Station,
ksburg, Miss.
R. Oswalt, and G. A. Pickering.
ailable from the National Technical Informa-
n Service, Springfield, VA 22161 as ADA-026
, Price codes: A02 in paper copy, A01 in
rofiche. Miscellaneous Paper H-76-11, May
6. 19 p, 1 fig, 8 photo.

scriptors: *Hydraulic models, *Construction
erials, Model studies.

ults of efforts to identify and evaluate new
niques and materials for constructing hydrau-
models at the U.S. Army Engineer Waterways
eriment Station are reported. A literature
rch was made to determine types of materials
ilable, and research personnel of other hydrau-
laboratories were contacted by telephone and
sonal visits to obtain independent and addi-
al evaluation. (WES)
7-02964

8I. Fisheries Engineering

PHYSIOLOGICAL RESPONSES OF RAINBOW TROUT (SALMO GAIRDNERI) TO ELECTROSHOCK,
Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 5C.
W77-03026

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EXPERIENCE IN CENTRALIZED COLLECTION, PROCESSING AND ANALYSIS OF SANITARY-HYGIENIC INFORMATION, (IN RUSSIAN),
Municipal Sanitary Epidemiology Station, Novokuznetsk (USSR).
For primary bibliographic entry see Field 5A.
W77-02908

10C. Secondary Publication And Distribution

THE ENVIRONMENTAL FATE OF SELECTED POLY-NUCLEAR AROMATIC HYDROCARBONS,
Stanford Research Inst., Menlo Park, Calif.
For primary bibliographic entry see Field 5B.
W77-02625

POLLUTION ASPECTS OF CATFISH PRODUCTION - REVIEW AND PROJECTIONS,
Georgia Univ., Athens. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5C.
W77-02626

LITERATURE STUDY OF SELECTED POTENTIAL ENVIRONMENTAL CONTAMINANTS, ANTIMONY AND ITS COMPOUNDS,
Little (Arthur D.), Inc., Cambridge, Mass.
For primary bibliographic entry see Field 05C.
W77-02629

MEDICAL AND BIOLOGIC EFFECTS OF ENVIRONMENTAL POLLUTANTS. CHROMIUM.
National Research Council, Washington, D.C. Committee on Biologic Effects of Atmospheric Pollutants.
For primary bibliographic entry see Field 05C.
W77-02635

MEDICAL AND BIOLOGIC EFFECTS OF ENVIRONMENTAL POLLUTANTS. VANADIUM.
National Research Council, Washington, D. C. Committee on Biologic Effects of Atmospheric Pollutants.
For primary bibliographic entry see Field 05C.
W77-02637

MOLYBDENUM: A TOXCOLOGICAL APPRAISAL,
Karolinska Institute, Stockholm (Sweden). Dept. of Environmental Hygiene.
For primary bibliographic entry see Field 05C.
W77-02647

THE ARCTIC COASTAL ENVIRONMENT OF ALASKA. VOL. II: A COMPILATION AND REVIEW OF SCIENTIFIC LITERATURE OF THE ARCTIC MARINE ENVIRONMENT,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 05C.
W77-02665

ADVANCED WASTEWATER TECHNOLOGY, A SELECTIVE CODED BIBLIOGRAPHY,
Environmental Protection Service, Burlington (Ontario). Waste Water Technology Centre.
For primary bibliographic entry see Field 05D.
W77-02741

INDEX TO WATER RESOURCES DATA FOR ILLINOIS,
Geological Survey, Champaign, Ill. Water Resources Div.
For primary bibliographic entry see Field 07C.
W77-02990

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W77-02694 5C

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Effluent Polishing by Filtration through Activated Alumina, Volume II, (March, 1975).
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7-03019 5C

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U. S. Geological Survey	W77-02968--02992	25

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CENTERS OF COMPETENCE AND THEIR SUBJECT COVERAGE

- Ground and surface water hydrology at the Illinois State Water Survey.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

Supported by the Environmental Protection Agency in cooperation with WRSIC

- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.
- Municipal wastewater treatment technology at the Franklin Institute Research Laboratories.

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- 2 WATER CYCLE
- 3 WATER SUPPLY AUGMENTATION AND CONSERVATION
- 4 WATER QUANTITY MANAGEMENT AND CONTROL
- 5 WATER QUALITY MANAGEMENT AND PROTECTION
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SELECTED WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center, Office of Water Research and Technology, U.S. Department of the Interior

VOLUME 10, NUMBER 7
APRIL 1, 1977

W77-03076 -- W77-03600

e Secretary of the U.S. Department of the Interior has de-
mined that the publication of this periodical is necessary in the
nsaction of the public business required by law of this Depart-
ment. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into 10 fields and 60 groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on the inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
Washington, DC 20240

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03 WATER SUPPLY AUGMENTATION AND CONSERVATION
Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

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Includes the following Groups: Control of Water on the Surface; Groundwater Management; Effects on Water of Man's Nonwater Activities; Watershed Protection.

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07 RESOURCES DATA
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09 MANPOWER, GRANTS, AND FACILITIES
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ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

2. WATER CYCLE

2A. General

CORRELATION ANALYSIS OF HYDROMETEOROLOGICAL DATA,
Central and Southern Florida Flood Control District, West Palm Beach. Environmental Engineering.
A. N. Shahane, D. Thomas, and P. Bock.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 102, No. HY10, Proceedings Paper 12484, p 1561-1572, October 1976. 2 fig, 7 tab, 10 ref, 2 append.

Descriptors: *Correlation analysis, *Statistical methods, Precipitation(Atmospheric), Drainage area, Evapotranspiration, Fourier analysis, Meteoric water, Rainfall, Runoff, Time series analysis, Meteorology, Statistics, Water vapor, Watersheds(Basins).
Identifiers: *Statistical analysis, Variance, Vapor transport, Terrestrial storage.

Mean monthly time series of precipitation, runoff, atmospheric water vapor transport, terrestrial storage, and evapotranspiration for watersheds distributed over the entire continental United States were analyzed by harmonic analysis to compute Fourier coefficients (with first four harmonics) and explained variances. In addition, linear cross-correlation coefficients for 10 combinations of the five time series were computed. The observed spatial variation of these parameters was thought to be useful to those faced with the formulation of statistical models for simulation and prediction applications. (Roberts-ISWS)
W77-03086

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT, VOLUME 5, HYPOTHETICAL FLOODS,
Hydrologic Engineering Center, Davis, Calif.
For primary bibliographic entry see Field 8B.
W77-03104

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT, VOLUME 6, WATER SURFACE PROFILES,
Hydrologic Engineering Center, Davis, Calif.
For primary bibliographic entry see Field 8B.
W77-03105

A THREE-DIMENSIONAL FINITE ELEMENT GROUND WATER MODEL,
California Univ., Davis. Water Science and Engineering Section.
For primary bibliographic entry see Field 2F.
W77-03109

THE UNIT HYDROGRAPH: A SATISFACTORY MODEL OF WATERSHED RESPONSE,
Massey Univ., Palmerston North (New Zealand). Dept. of Geography.
For primary bibliographic entry see Field 4D.
W77-03126

SEASONAL DEMARCATION IN PENNSYLVANIA FOR HYDROLOGICAL USE,
Massey Univ., Palmerston North (New Zealand). Dept. of Geography.
For primary bibliographic entry see Field 2B.
W77-03127

TWO DIMENSIONAL BOTTOM WITHDRAWAL FROM A DENSITY-STRATIFIED RESERVOIR,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 4A.
W77-03129

A PERTURBATION APPROACH TO TWO-DIMENSIONAL BOTTOM WITHDRAWAL FROM A DENSITY-STRATIFIED RESERVOIR,
Wisconsin Univ.-Madison. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 4A.
W77-03151

NORMAL-MODE ANALYSIS OF THE STRUCTURE OF BASEFLOW RECESSION CURVES,
Department of the Environment, Reading (England). Central Water Planning Unit.
For primary bibliographic entry see Field 2F.
W77-03313

LOW FLOW MODELING IN SMALL STEEP WATERSHEDS,
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 4D.
W77-03316

WET AND DRY PERIODS OF ANNUAL FLOW SERIES,
Technical Univ. of Istanbul (Turkey). Dept. of Hydraulic and Water Power; and Technical Univ. of Istanbul (Turkey). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W77-03319

2B. Precipitation

RAINFALL IN THE SEYCHELLES 1941 TO 1970,
D. Aspin.
Weather, Vol. 31, No. 2, p 47-56, February 1976. 6 fig, 1 tab, 10 ref.

Descriptors: *Precipitation(Atmospheric), *Rainfall, *Indian Ocean, Islands, Climates, Droughts, Wet seasons, Monthly, Annual, Climatic data, Measurement.
Identifiers: *Seychelles, *Mahe, Moving means, Intertropical Convergence Zone, Standard deviation, Climatic change.

The trend of rainfall by months and years for Long Pier, Victoria, in the Seychelles Group of the Indian Ocean, was studied. It was found that there was only a single monthly maximum (January) and single monthly minimum (July) even though the Intertropical Convergence Zone passes over the island twice each year. It was further found that there has been an increase in annual rainfall from 1940 to 1970 with about the same reliability as mid-latitude stations. Ten-year moving means for each month show that all months except June had an increase in rainfall over the 30-year period. The significance of this rainfall increase in the Seychelles when compared with the decrease in rainfall on the southern margins of the Sahara and the Indian subcontinent was discussed. (Jones-ISWS)
W77-03096

RELATION BETWEEN ATMOSPHERIC POLLUTION, PRECIPITATION, AND STREAMWATER QUALITY NEAR A LARGE URBAN-INDUSTRIAL COMPLEX,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 5B.
W77-03097

ELECTRONIC SENSOR FOR LOW-TO-MEDIUM WINDSPEEDS,
Agricultural Research Service, Yakima, Wash.
For primary bibliographic entry see Field 7B.
W77-03099

A REVIEW OF HAIL-MEASURING INSTRUMENTS,
Illinois State Water Survey, Urbana.
N. G. Towery, S. A. Changnon, Jr., and G. M. Morgan, Jr.
Bulletin American Meteorological Society, Vol. 57, No. 9, p 1132-1140, September 1976. 7 fig, 1 tab, 38 ref. NSF GI-37859, ERP75-09930.

Descriptors: *Hail, *Instrumentation, *Measurement, Equipment, Cost, Remote sensing, Radar, Precipitation(Atmospheric), Storms, Ice, Rain, Meteorology.
Identifiers: *Hail sensors, Hailpads, Hail recorders.

The characteristics of commonly used surface hail instruments were reviewed and instruments evaluated. The instruments evaluated were classified into two major categories: integrating and recording. The integrating sensors are relatively inexpensive and provide certain useful hail data. The recording sensors are much more expensive but provide more useful data, including time of hail. The review included the principles of operation, types of data obtained, operational advantages and disadvantages, and approximate cost of each type of instrument. (Sims-ISWS)
W77-03101

GUIDELINES FOR FLASH FLOOD AND SMALL TRIBUTARY FLOOD PREDICTION,
National Weather Service, Kansas City, Mo. Central Region.
For primary bibliographic entry see Field 4A.
W77-03114

SEASONAL DEMARCATION IN PENNSYLVANIA FOR HYDROLOGICAL USE,
Massey Univ., Palmerston North (New Zealand). Dept. of Geography.
R. G. Heerdegen.
Water Resources Bulletin, Vol 10, No 4, August, 1974, p. 813-817. 6 fig, 3 ref. OWRT B-041-PA(5), 14-31-0001-3635.

Descriptors: *Pennsylvania, *Dormancy, Weather data, Hydrologic data, *Seasonal.
Identifiers: *Growing season, *Seasons, *Dormant season, Climatological data, Hydrologic use.

A study was made of the length of the growing and dormant season in Pennsylvania by isoline interpolation from climatological data. Maps of the beginning and ending of the growing and dormant seasons, length of growing season and ratio of growing to dormant season are included. It is suggested that the growing season is a good index of seasonality and that the length of the growing season and the ratio of length of growing to dormant season are good parameters for hydrologic use. It could be concluded that no single date can be assigned to the start of the growing season (six weeks difference State-wide for Summer and four weeks difference for Winter), that no even length can be assigned to the seasons (growing season ranging from four to six months in length) and that four distinct seasons do not exist, but rather there are two major seasons, growing and dormant, between which are short transition periods. (Sink-Penn State)
W77-03127

WEATHER MODIFICATION DESIGN STUDY FOR STREAMFLOW AUGMENTATION IN THE NORTHERN SIERRA NEVADA, EXECUTIVE SUMMARY,
M and B Associates, San Ramon, Calif.
For primary bibliographic entry see Field 3B.
W77-03212

WEATHER MODIFICATION DESIGN STUDY FOR STREAMFLOW AUGMENTATION IN THE NORTHERN SIERRA NEVADA, VOLUME I - METEOROLOGY AND HYDROLOGY OF THE NORTHERN SIERRA NEVADA, FINAL REPORT.
M and B Associates, San Ramon, Calif.
For primary bibliographic entry see Field 3B.
W77-03213

WEATHER MODIFICATION DESIGN STUDY FOR STREAMFLOW AUGMENTATION IN THE NORTHERN SIERRA NEVADA, VOLUME II - PHYSICAL AND STATISTICAL DESIGN, FINAL REPORT.
M and B Associates, San Ramon, Calif.
For primary bibliographic entry see Field 3B.
W77-03214

PREPARATION OF HYDRODYNAMICAL-NUMERICAL AND 3-PARAMETER SMALL-MESH ATMOSPHERIC MODELS FOR COASTAL WATERS IN THE GULF OF ALASKA,
Naval Environmental Prediction Research Facility, Monterey, Calif.
For primary bibliographic entry see Field 5B.
W77-03235

MARINE CLIMATOLOGY OF THE GULF OF ALASKA AND THE BERING AND BEAUFORT SEAS,
Alaska Univ., Anchorage. Arctic Environmental Information and Data Center.
For primary bibliographic entry see Field 5B.
W77-03239

MARINE CLIMATOLOGY OF THE GULF OF ALASKA AND THE BERING AND BEAUFORT SEAS. PART III. CLIMATIC ATLASES,
Alaska Univ., Anchorage. Arctic Environmental Information and Data Center.
For primary bibliographic entry see Field 5B.
W77-03240

NEAR-SHORE ATMOSPHERIC MODIFICATION,
National Oceanic and Atmospheric Administration, Seattle, Wash. Pacific Marine Environmental Lab.
For primary bibliographic entry see Field 5B.
W77-03242

THE COMPOSITION OF RAINWATER AT TWO SITES NEAR TOWNSVILLE, QLD. (AUSTRALIA),
Commonwealth Scientific and Industrial Research Organization, Townsville (Australia). Div. of Soils.
For primary bibliographic entry see Field 2K.
W77-03279

ELECTROSTATIC INDUCTION PARAMETERS TO ATTAIN MAXIMUM SPRAY CHARGE TO CLEAR FOG,
Naval Weapons Center, China Lake, Calif. Research Dept.
For primary bibliographic entry see Field 3B.
W77-03299

ARTIFICIAL MODIFICATION OF ATMOSPHERIC PROCESSES,
For primary bibliographic entry see Field 3B.
W77-03303

PRECIPITATION ON THE ARAL SEA SURFACE, (IN RUSSIAN),
A. E. Asarin.
Probl Osvoeniya Pustyn' 1, p 58-62, 1975.

Descriptors: *Precipitation(Atmospheric), *Water balance, Data collections, Saline water, Lakes.
Identifiers: *Aral Sea, *USSR.

To calculate water balance, the mean arithmetic values of the total annual precipitation (recorded from all the stations on the Aral Sea (USSR) were taken as the computed values of annual precipitation rate of the Aral Sea surface from 1926-1970.--Copyright 1976, Biological Abstracts, Inc.
W77-03592

2C. Snow, Ice, and Frost

RADIO-ECHO LAYERS AND THE RECENT STABILITY OF THE WEST ANTARCTIC ICE SHEET,
Ohio State Univ. Research Foundation, Columbus. Inst. of Polar Studies and Ohio State Univ., Columbus. Dept. of Geology and Mineralogy.
I. M. Whillans
Nature, Vol. 264, No. 5582, p 152-155, November 11, 1976. 4 fig, 38 ref

Descriptors: *Remote sensing, *Model studies, *Ice cover, *Antarctic, Aircraft, Radar, Surveys, Stability, Ice, Cold regions, Glaciers, Glaciology.
Identifiers: *Ice sheets.

A new method for studying polar ice sheets confirmed the generally accepted concepts of ice sheet flow and found that a region near the ice crest of the West Antarctic ice sheet has been stable for about 30,000 yr. During the austral summer 1974-1975, radio-echo sounding flights were conducted in the Antarctic. Equipment was flown in an LC-130 (Hercules) aircraft by the US Navy as part of the United States Antarctic Research Program. A very simple model for the flow of the ice sheet was used. The model results and the radio-echo results are independent. The model was developed before the radio sounding flights were conducted. The simplest and most plausible explanation for the similarity of the calculated isochrons and the radio-echo layering is that the mass-balance, velocity field, and shape of the central portion of the ice sheet have not changed significantly during approximately the past 30,000 years. (Sims-ISWS)
W77-03100

A REVIEW OF HAIL-MEASURING INSTRUMENTS,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 2B.
W77-03101

WEATHER MODIFICATION DESIGN STUDY FOR STREAMFLOW AUGMENTATION IN THE NORTHERN SIERRA NEVADA, EXECUTIVE SUMMARY,
M and B Associates, San Ramon, Calif.
For primary bibliographic entry see Field 3B.
W77-03212

WEATHER MODIFICATION DESIGN STUDY FOR STREAMFLOW AUGMENTATION IN THE NORTHERN SIERRA NEVADA, VOLUME III - OPERATIONAL DESIGN, FINAL REPORT.
M and B Associates, San Ramon, Calif.
For primary bibliographic entry see Field 3B.
W77-03215

DELINEATION AND ENGINEERING CHARACTERISTICS OF PERMAFROST BENEATH THE BEAUFORT SEA,
Cold Regions Research and Engineering Lab., Hanover, N. H.
P. V. Sellman, R. Berg, J. Brown, S. Blouin, and E. Chamberlain.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 12. Geology, p 391-408, April 1976. 1 fig, 55 ref, 2 append. 01-50-22-2313.

Descriptors: *Alaska, *Permafrost, *Cold regions, *Baseline studies, *Resources development, *Environmental effects, Maps, Bibliographies, Sampling.
Identifiers: *Outer Continental Shelf, Oil exploration, Oil development, *Beaufort Sea.

The report was prepared as the mobilization phase for offshore drilling at Prudhoe Bay was being completed. The entire effort to date has involved the planning and mobilization of a drilling and sampling program for the purpose of gathering data on the physical, chemical and thermal properties of permafrost beneath the Beaufort Sea. Therefore, the report deals primarily with activities leading up to the actual data acquisition phase. A preliminary bibliography on subsea permafrost from Soviet literature is included. (Sinha-OEIS)
W77-03247

OFFSHORE PERMAFROST STUDIES, BEAUFORT SEA,
Geological Survey, Menlo Park, Calif
For primary bibliographic entry see Field 2L.
W77-03249

MARINE ENVIRONMENTAL PROBLEMS IN THE ICE COVERED BEAUFORT SEA SHELF AND COASTAL REGIONS,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2L.
W77-03250

DISTRIBUTION AND CHARACTER OF ICINGS IN NORTHEASTERN ALASKA,
Geological Survey, Menlo Park, Calif.
D. Harden, P. Barnes, and E. Reimnitz.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 12. Geology, p 600-625, April 1976. 6 fig, 18 ref.

Descriptors: *Alaska, *Permafrost, *Resources development, *Baseline studies, *Environmental effects, *Water pollution, Ice, Organic compounds.
Identifiers: *Outer Continental Shelf, *River icings, Oil exploration, Oil development, North Slope, Satellite imagery, Braided channels.

An examination of the distribution of river icings seen in ERTS-1 satellite imagery and high- and low-altitude aerial photography of Alaska's North Slope indicates these features are numerous and widespread east of the Colville River and rare to the west. Where icings occur, stream channels are wide and often form braided channels. Their distribution can be related to changes in stream gradient and to the occurrence of springs. Large icings, such as on the Kongakut River, often remain through the summer melt season to form the nucleaus of icings in the succeeding winter. Major icings also are likely to have a profound influence on the nature of permafrost. The map of river icings may serve as a guide to the occurrence year-round flowing water, a sparse commodity in the area. (Sinha-OEIS)
W77-03252

BEAUFORT SEACOAST PERMAFROST STUDIES,
Alaska Univ., College. Geophysical Inst.
J. C. Rogers.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 13. Geology, p 257-283, April 1976. 4 fig, 11 ref, append. 03-5-022-55.

Descriptors: *Alaska, *Permafrost, *Oil pollution, *Water pollution, *Baseline studies, *Resources development, *Environmental effects, Coasts, Geophysics.
Identifiers: *Outer Continental Shelf, *Seismic refraction, *Offshore permafrost, Petroleum resources, Oil exploration, Oil development, *Beaufort Sea, Ocean bottom.

The known oil reserves along the Beaufort Seacoast coupled with a national need to develop these resources have focused increased attention on the distribution and character of permafrost in that area. Results of work performed at Prudhoe Bay and Pt. Barrow, Alaska during the 1975 summer field season are reported. A high velocity refractor, characteristics of sub-bottom permafrost, was located in Prudhoe Bay near the shore and followed a distance of 1.4 km offshore. The surface of the layer, which dips downward in the offshore direction, ranges in depth from 12 to 20 meters to about 27 to 35 meters. The first depth estimates correspond to a distance of approximately 400 m from shore while the latter correspond to a distance of 1.4 m from shore. The average slope of the permafrost surface is about 0.8 deg, a figure that is in agreement with the results of drilling into the bottom material by Harrison and Osterkamp of the University of Alaska. However, local variations in the surface slope appear to be large, perhaps as much as 10 degrees. Refraction lines in Elson Lagoon near Pt. Barrow did not indicate the presence of ice bonded permafrost within the depth capability of the equipment used (about 30 meters).
W77-03262

THE INTERACTION OF OIL WITH SEA ICE IN THE ARCTIC OCEAN,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 5C.
W77-03267

DYNAMICS OF NEAR-SHORE ICE,
Cold Regions Research and Engineering Lab., Hanover, N. H.
W. F. Weeks, and A. Kovacs.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 14. Ice, p 9-50, April 1976. 16 fig, 44 ref, append. 01-3-022-2313.

Descriptors: *Alaska, *Sea ice, *Baseline studies, *Resources development, *Environmental effects, *Hazards, Water pollution, Oil spills, Oil pollution, Pipelines, Cold regions.
Identifiers: *Outer Continental Shelf, Oil development, Petroleum resources, Near-shore ice, Fast ice, Pack ice, Engineering problems, Beaufort Sea, Chukchi Sea.

The purpose of this project is to measure the motions of both the fast ice and the near shore pack ice to see if the motions of the latter can be understood and used to predict the motions of the former. While these measurements are being made a number of other studies will be undertaken on the nature of near shore sea ice (ice structure, ice thickness, bottom scoring, ridge characteristics, grounded ice features). Work is also underway to characterize the variations in near shore pressure ridging by the use of laser profilometry and SLAR imagery. A knowledge of the motion deformation and physical characteristics of both the near-shore pack ice and the fast ice is essential to adequately designing and estimating the hazards associated with a variety of engineering options that may be considered for offshore operations in the near coastal areas of the Beaufort and Chukchi Seas (e.g. construction of gravel islands, structural platforms, causeways, reinforced ice platforms, buried pipelines, or the utilization of the ice sheet itself to carry large, longterm loads). (Sinha-OEIS)
W77-03268

DYNAMICS OF NEAR-SHORE ICE (DATA BUOYS),
Washington Univ., Seattle. Dept. of Atmospheric Sciences.
N. Untersteiner.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 14. Ice, p 51-57, April 1976. 1 fig. 03-5-022-67.

Descriptors: *Alaska, *Arctic Ocean, *Sea ice, *Meteorologic data, *Baseline studies, *Resources development, *Hazards, Buoys, Measurement.
Identifiers: *Outer Continental Shelf, *Data buoys, *Oceanographic data, *Atmospheric data, *Petroleum resources, *Oil development, Near-shore ice, Fast ice, Data acquisitions, Arctic Ice Dynamics Joint Experiment(AIDJEX), Beaufort Sea, Chukchi Sea.

Twenty ice buoys are to be deployed to gather data on ice movement and oceanographic and atmospheric conditions in the near-shore areas of the Beaufort and Chukchi Seas of the Arctic Ocean. The buoy deployments are to be accomplished in conjunction with field work being conducted by the Arctic Ice Dynamics Joint Experiment (AIDJEX). Four buoys with oceanographic and meteorological sensors were deployed aong the continental shelf break in November, 1975, by NOAA chartered helicopter from Deadhorse, Alaska, and the AIDJEX main ice station in the Beaufort Sea, and eight tracking-only buoys were parachuted from NOAA chartered aircraft in December. Data from the buoys are being received by transmission through the NIMBUS-6 satellite and placed in the AIDJEX Data Bank. (Sinha-OEIS)
W77-03269

STUDY OF CLIMATIC EFFECTS ON FAST ICE EXTENT AND ITS SEASONAL DECAY ALONG THE BEAUFORT SEA COAST,
Colorado Univ., Boulder. Inst. of Arctic and Alpine Research.
R. G. Barry.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Ending March 1976, Vol 14. Ice, p 58-115, April 1976. 9 fig, 5 tab, 7 ref, 4 append. 03-5-022-91.

Descriptors: *Alaska, *Sea ice, *Baseline studies, *Resources development, *Environmental effects, Hazards, Data collections, Cold regions, Water pollution, Seasonal.
Identifiers: *Outer Continental Shelf, *Fast ice, Climatic effects, Oil exploration, Oil development, Petroleum resources, *Beaufort Sea, Synoptic meteorology.

The primary objective of this study was to assess the role of climatic factors in determining the extent and seasonal decay of fast ice along the Beaufort Sea coast. Particular attention was given to synoptic meteorological events during critical phases of the seasonal cycle. Surface morphological categories have been classified. The scheme is intended as the basis for linking satellite-observed surface changes to climatic (and other) factors. Working maps of ice features in the Prudhoe Bay sector during summer 1974 have been compiled. Maps of grey scale information from 1975 LANDSAT frames between 145 and 151 deg W longitude have been prepared. Fifteen representative sample areas of approximately 16 sq. km. each across the mapped area were chosen in an attempt to evaluate the progression of surface reflected radiance through the melt season. The winds indices have been determined for both along-shore and offshore components at Barrow and Barter Island for all months from 1969 to August 1974, but preliminary analysis has concentrated on the winter months. (Sinha-OEIS)
W77-03270

MECHANICS OF ORIGIN OF PRESSURE RIDGES, SHEAR RIDGES AND HUMMOCK FIELDS IN LANDFAST ICE,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 2L.
W77-03271

MORPHOLOGY OF BERING NEAR SHORE ICE CONDITIONS BY MEANS OF SATELLITE AND AERIAL REMOTE SENSING,
Alaska Univ., College. OCS Coordination Office.
W. J. Stringer.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 14. Ice, p 155-250, April 1976. numerous fig, 5 ref. 03-5-022-55.

Descriptors: *Alaska, *Sea ice, *Offshore platforms, *Resources development, *Environmental effects, *Hazards, *Baseline data, Remote sensing, Data collections, Cold regions, Water pollution, Oil spills, Oil pollution.
Identifiers: *Outer Continental Shelf, Petroleum resources, Oil exploration, Oil development, *Bering Sea, Ice conditions, Morphology.

The objective of this study was to develop a comprehensive morphology of ice conditions in the near shore areas of the Bering Sea with special emphasis given to ice conditions which might be hazardous to offshore petroleum exploration and development. The preliminary conclusions are that, unlike ice conditions along the Beaufort coast, ice conditions along the Bering coast are highly variable. Dynamic ice events are possible in the near shore areas during the entire ice season except for the most highly protected bays and inlets. The nature of these events is highly dependent on location and meteorological conditions. The major implication with respect to OCS oil and gas development is that except for a few highly localized areas, it is not possible to depend on a stable sheet of ice from which to conduct exploration and other petroleum related activities. It would follow that all activities including exploration, platform construction, etc would have to be performed during the ice-free season. (Sinha-OEIS)
W77-03272

MORPHOLOGY OF BEAUFORT NEAR SHORE ICE CONDITIONS BY MEANS OF SATELLITE AND AERIAL REMOTE SENSING,
Alaska Univ., College. OCS Coordination Office.
W. J. Stringer.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 14. Ice, p 251-311, April 1976. numerous fig, 5 ref. 03-5-022-55.

Descriptors: *Alaska, *Sea ice, *Resources development, *Baseline studies, *Environmental effects, *Offshore platforms, *Hazards, Remote sensing, Data collections, Cold regions, Water pollution, Oil spills, Oil pollution.
Identifiers: *Outer Continental Shelf, Petroleum resources, Oil exploration, Oil development, *Beaufort Sea, Ice conditions, Morphology.

The objective of this study was to develop a comprehensive morphology of ice conditions in the near-shore areas of the Beaufort Sea with special emphasis given to ice conditions which might be hazardous to offshore petroleum exploration and development. The preliminary conclusions are that within a certain range of variability, ice conditions along the Beaufort coast are predicatable: for several months a great deal of reliability can be placed on the existence of a stable sheet of ice extending to roughly the location of the 10-fathom contour. The precise location of the stable ice boundary will be determined from the morphology being developed. Beyond this stable ice boundary, dynamic ice events can occur at any time depending largely on meteorological conditions. The im-

plications to OCS oil and gas development are that within the stable ice boundary, for several months of the year, ice conditions are favorable to the use of the ice surface for exploration and other activities. Beyond this boundary conditions become unreliable or predictably hazardous. (Sinha-OEIS)
W77-03273

EXPERIMENTAL MEASUREMENTS OF SEA ICE FAILURE STRESSES NEAR GROUNDED STRUCTURES,
Alaska Univ., College. OCS Coordination Office.
R. D. Nelson, and W. M. Sackinger.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 14. Ice, p 313-331, April 1976. 3 fig, 8 ref. 03-5-022-55.

Descriptors: *Alaska, *Sea ice, *Resources development, *Baseline studies, *Environmental effects, *Hazards, Failure(Mechanics), Telemetry, Water pollution, Oil pollution.
Identifiers: *Outer Continental Shelf, Oil exploration, Oil development, Petroleum resources, Grounded structures, Ice sheets, Land fast ice, Pack ice, Offshore structures.

The objectives of this study were to measure, in situ, the stresses generated in a sea ice sheet as it fails in the vicinity of a static obstacle and the rate of approach of the ice sheet during this process. The results of the first experiment support the hypothesis that stresses generated by pack ice impingement on land fast ice are low when the motion is predominantly shearing past land fast ice. This implies that at certain times land fast ice may be a safe location for oil exploration or drilling activities. The radio telemetry system developed for the stress sensors provides a particularly convenient method of stress analysis. (Sinha-OEIS)
W77-03274

BEAUFORT SEA, CHUKCHI SEA, BERING STRAIT HISTORICAL BASELINE ICE STUDY,
Alaska Univ., College. Dept. of History.
W. R. Hunt, and C. M. Haske.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 14. Ice, p 333-385, April 1976. append.

Descriptors: *Alaska, *Sea ice, *Data collections, *Resources development, *Baseline studies, History.
Identifiers: *Outer Continental Shelf, *Ice conditions, *Beaufort Sea, Bering Sea, *Chukchi Sea, Petroleum resources.

The objectives of this study were to collect data on the history of ice conditions in the Beaufort and Chukchi Seas, and Bering Strait, to synthesize this data, and to present the results in report and cartographic form. The source materials examined include the field notes of explorers, journals of coastal residents and traders and some whaling journals. The appendix contains the shore observations from the Alaska File of the Revenue Cutter Service from 1867 to 1914. The most significant observation is the documentation of a probable 26-year cycle of severe ice conditions. (Sinha-OEIS)
W77-03275

DEVELOPMENT OF HARDWARE AND PROCEDURES FOR IN-SITU MEASUREMENT OF CREEP IN SEA ICE,
Alaska Univ., College. Geophysical Inst.
L. H. Shapiro, R. D. Nelson, W. M. Sackinger, and E. R. Hoskins.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 14. Ice, p 387-407, April 1976. 13 ref. 03-5-022-55.

Descriptors: *Alaska, *Sea ice, *Resources development, *Baseline studies, Creep, Measurement, Hazards, Environmental effects, Instrumentation.
Identifiers: *Outer Continental Shelf, Oil exploration, Oil development, Petroleum resources, Ice conditions, In-situ measurement, Hardware, Strain gauges.

The specific objective of this project was to develop hardware and procedures for the in situ measurement of the creep behavior of sea ice. Any permanent or semi-permanent structures off the Arctic Coast of Alaska must contend with the hazard that sea ice presents to its stability. In order to properly design such installations it is necessary that reliable values of the mechanical properties of the ice be available both for establishing the design of the structure, and for the evaluation of that design by public agencies. In addition, significant savings in cost of construction can be realized if less conservative safety factors can be utilized. The use of steel flatjacks, expanded with nitrogen gas, for loading devices has proved successful in all the tests to date. Similarly, no serious problems have been encountered in the preparation of strain cells although more work is needed, particularly in coarse crystalline ice where the size of the grains may be large enough to distort the strain field in the cell. In addition, there is still a question as to whether small strain gauges will be adequate for testing later in the spring when higher temperatures will permit the strain to become much greater than those encountered to date. However, the basic questions regarding the design of a suitable strain cell appears to have been resolved. (Sinha-OEIS)
W77-03276

THE CLASSIFICATION AND GEOMORPHIC IMPLICATIONS OF THAW LAKES ON THE ARCTIC COASTAL PLAIN, ALASKA,
Cold Regions Research and Engineering Lab., Hanover, N.H. Northern Engineering Research Branch.
P. V. Sellmann, J. Brown, R. I. Lewellan, H. McKim, and C. Merry.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A021 226, Price codes: A03 in paper copy, A01 in microfiche. Research Report 344, December 1975. 25 p, 11 fig, 1 tab, 30 ref.

Descriptors: *Ice, *Permafrost, *Lakes, *Arctic, *Alaska, Remote sensing, Satellites(Artificial), Classification, Thawing, Cold regions, Geomorphology, Geology.
Identifiers: *Thaw lakes, *Arctic Coastal Plains(Alaska), ERTS, Lake morphology.

The lakes of the Arctic Coastal Plain of northern Alaska were classified, based on size, shape, orientation, and distribution, into six lake units and three nonlake units. Regional slope and relief were demonstrated to control lake size. The largest lakes occur on the flattest, northernmost segment of the Coastal Plain. Using ERTS-1 sequential imagery and existing photography and data, lakes were grouped according to three depth ranges, less than 1 m, 1-2 m and greater than 2 m. Deepest lakes have the longest period of summer ice cover. Ice on shallow lakes melts the earliest. Maximum depths of lakes were computed based on ice volume content of the perennially frozen ground (permafrost), and these computations agreed with observed values and ranges. The lake classification and regional ERTS-1 coverage also appear to provide additional information on the limits of late-Pleistocene transgressions on the Coastal Plains. (Sims-ISWS)
W77-03296

STRENGTH OF ICE UNDER MULTIAXIAL LOADING,
Southwest Research Inst., San Antonio, Tex.
J. Lankford, and P. H. Francis.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A01[illegible] 373, Price codes: A02 in paper copy, A01 in microfiche. Final Report 02-4071, September 1975. 10 p, 3 fig, 1 tab, 5 ref. ARO DAHC04-75-C-0002.

Descriptors: *Ice, *Strength of materials, *Laboratory tests, Strength, Compressive strength, Failures, Failure(Mechanics), Pressure, Stress, Ice loads, Analytical techniques.
Identifiers: *Multiaxial loading, Ice strength.

Strength tests were carried out using hollow, cylindrical specimens of polycrystalline ice, subject to combined axial compression, internal/external pressure. A portion of the failure envelope in principal stress space was mapped out and compared with data of other workers. The results of all available multiaxial tests can be fit by a modified Paul first order criterion. (Sims-ISWS)
W77-03301

STRUCTURE OF THE GLACIER CHARLES RABOTS BRE, NORWAY,
Eidgenoessische Technische Hochschule, Zurich (Switzerland). Geologisches Institut, and Eidgenoessische Technische Hochschule, Zurich (Switzerland). Geographisches Institut.
M. J. Hambrey.
Geological Society of America Bulletin, Vol. 87, No. 11, p 1629-1637, November 1976. 10 fig, 1 tab, 40 ref.

Descriptors: *Glaciers, *Glaciology, *Surveys, *Geomorphology, Ice, On-site investigations, Ablation, Folds(Geologic), Stratification, Sedimentary structures, Movement, Foreign countries.
Identifiers: *Norway, *Charles Rabots Bre glacier, Ice fracture, Secondary structures.

Sedimentary stratification, foliation, and crevasse traces (including those of healed crevasses) are well displayed at the surface of the small, steep glacier Charles Rabots Bre. Two main flow units cropping out as convex downglacier arcuate systems of stratification, are recognizable, but others, related to the irregular distribution of the accumulation areas, also contribute significantly to the outcrop pattern. Between the flow units and at the margins of the glacier, strong, steeply dipping longitudinal foliation crops out parallel to longitudinally striking stratification. Much of this foliation is believed to form as a result of shearing and recrystallization in the planes of favorably oriented sedimentary layers. The persistence of crevasse traces below the sets of marginal and transverse crevasses in an area of strong ablation indicates that fracture occurs to greater depths in temperate glacier ice than is generally believed. (Humphreys-ISWS)
W77-03311

BREAKUP FLOODING AND NUTRIENT SOURCE OF COLVILLE RIVER DELTA DURING 1973,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
For primary bibliographic entry see Field 5B
W77-03388

2D. Evaporation and Transpiration

COMPUTATION OF THE POTENTIAL EVAPOTRANSPIRATION AND THEIR COMPARISON WITH VALUES OF THE ACTUAL EVAPOTRANSPIRATION OF LYSIMETERS. (IN GERMAN),
Agrarmeteorologische Forschungsanstalt, Brunswick (West Germany).
H. Shiff.
Arch Meteorol Geophys Bioklimatol Ser B Klimatol Unwetmeteorol Strahlungsforsch 23(4), p 331-342, 1975.

escriptors: *Evapotranspiration, *Lysimeter, ethodology, Europe, *Grasses.
entifiers: West Germany, *Potential evapotrans-ration, Thornthwaite method, Haude method.

esults of the computation of the potential apotranspiration by Thornthwaite and by Haude e discussed and compared with the values of eighable, 1 m2 lysimeters with a short grass ver during 4 yr in the Agrometeorological Sta-n of the Meteorological and Coimatological In-itute in Hannover-Herrenhausen (West Ger-any).--Copyright 1976, Biological Abstracts, Inc.
77-03118

OMPARATIVE PHOTOSYNTHETIC RODUCTION OF MOJAVE DESERT SHRUBS,
alifornia Univ., Los Angeles. Lab. of Nuclear edicine and Radiation Biology.
A. Bamberg, G. E. Kleinkopf, A. Wallace, and Vollmer.
ology, Vol. 56, p. 732-736, 1975. 3 fig, 2 tab, 11 f.

escriptors: *Transpiration, *Photosynthesis, Desert plants, *Plant growth, *Moisture content, ater loss, Moisture uptake, Deserts, Arid cli-ates, Water requirements, Radiation, Tempera-re, Soil moisture, Stress, Moisture stress, eciduous trees, Adaptation, Energy conversion, nvironmental effects, Soil-water-plant relation-ips, *Shrubs.
entifiers: Mojave Desert shrubs.

ranspiration and net photosynthetic rates of veral species of desert shrubs were measured as function of season and environmental variables the northern Mojave Desert. Many desert plants rry out most or all of their photosynthesis and owth during the favorable periods of the year; owever, a few species have adapted to desert nditions sufficiently to carry on photosynthesis rough the hot, dry summer months. Gas change rates were determined for five shrub ecies under natural field conditions. Water atus, temperature, and radiation were recorded nultaneously with net photosynthesis and trans-ration. The results are presented. Drought-eciduous species, Ambrosia dumosa, Lycium an-rsonii, and Lycium pallidum, had higher max-um rates and greater water loss than the ever-een Larrea tridentata and summer green rameria parvifolia. Results indicate that plant ecies in the northern Mojave Desert have a cultative response to moisture and temperature nditions and during favorable periods exhibit newed photosynthetic activity within a few ys, continuing active gas exchange and growth long as conditions are favorable. The response ries in intensity and length depending on the nount of moisture received and subsequent tem-ratures. Desert plants, with few exceptions, are tremely labile and exhibit large variability and fferent adaptive strategies. (Jamail-Arizona)
77-03141

ATES OF PHOTOSYNTHESIS AND TRANS-RATION AND DIFFUSIVE RESISTANCE OF X GRASSES GROWN UNDER CONTROLLED ONDITIONS,
griculturai Research Service, Mandan, N. Dak. orthern Great Plains Research Center.
B. Frank, and R. E. Barker.
gronomy Journal, Vol. 68, No. 3, p 487-490, ay-June, 1976. 4 fig, 2 tab, 8 ref.

escriptors: *Photosynthesis, *Transpiration, Water utilization, *Stomata, *Wheatgrasses, Car-n dioxide, Diffusion, Range grasses, Re-tance, Growth stages, Water vapor, Antitrans-rants, Moisture stress, Stress, *Grasses, Trans-ration control, Plant physiology, Moisture ficit.
entifiers: *Mesophyl.

Experiments were conducted to determine rates of photosynthesis, transpiration and stomatal diffusion resistance to both water vapor and carbon dioxide in six grass species at three carbon dioxide concentrations and four light intensities. The results are presented. They indicate that the water use efficiency in photosynthesis was greater at heading than at tilling growth stage for all species. From an agronomic standpoint, water use efficiency is based on dry matter production and soil water extraction, and is probably best determined under field conditions. The relationship between water use efficiency calculations utilizing dry matter production as compared with calculations based on transpiration-photosynthesis, transpiration, and stomatal characteristics probably strongly affect the productivity of the forage species being grown. (Jamail-Arizona)
W77-03142

CHANGES IN THE TRANSPIRATION RATE AND LEAF WATER CONTENT IN SEVERAL VARIETIES OF CRYPTOMERIA JAPONICA SUBJECTED TO WATER STRESS, (IN JAPANESE),
Government Forest Experiment Station, Tokyo (Japan).
Z. Kishi.
J Jpn For Soc 57(6); p 197-200, 1975.

Descriptors: *Transpiration, *Leaves, *Moisture content, *Water loss, *Drought resistance, *Drought tolerance, Water requirements, Moisture deficit, Moisture stress.
Identifiers: Cryptomeria Japonica, Sanbu, Boka.

The resistance to dryness of 'Sanbu' and 'Boka' cultivars of C. japonica was studied. One-year old plants were raised in pots with 60-80% water and then the watering was stopped. When the moisture began to decrease, the transpiration rate of 'Sanbu' decreased faster than that of 'Boka'. Accordingly the water contents of the leaves decreased more slowly in 'Sanbu' than in 'Boka'. However, when the moisture was severely decreased, 'Sanbu' showed greater decrease in water contents than 'Boka' did. 'Sanbu' generally grows well in a dry area, although it is susceptible to the dryness of winter.
W77-03155

EVAPOTRANSPIRATION REDUCTION BY FIELD GEOMETRY EFFECTS,
Oklahoma State Univ., Stillwater. Dept. of Agronomy.
J. F. Stone, G. N. McCauley, E. W. Chin Choy, and H. E. Reeves.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 244, Price codes: A05 in paper copy, A01 in microfiche. Oklahoma Water Resources Research Institute, Stillwater, Completion Report, November 1976. 93 p, 21 fig, 11 tab, 47 ref. Submitted by Oklahoma Agricultural Experiment Station. OWRT B-029-OKLA(1). 14-31-0001-4120.

Descriptors: *Evapotranspiration, *Soil-water-plant relationships, *Transpiration, Water balance, Moisture, Climatology, Air circulation, Advection, Winds, *Peanuts, *Grain sorghum, Cultivation, Energy budget, Moisture availability.
Identifiers: *Row spacing, *Row direction, *Field geometry effects.

The objectives were to identify factors causing peanuts planted in narrow north-south rows to consume less water than in other spacings and orientations and to look for this effect in grain sorghum. Peanuts were studied in 30 and 90 cm rows oriented north-south and east-west. Grain sorghum was studied in 45 and 142 cm north-south rows. Water content of the soil profile was determined by the neutron method and the deep drainage component from the profile was monitored using tensiometers. Micrometeorological conditions were monitored to correlate with evaporative water loss. Energy balance measurements were obtained and the solar radiation, net radiation, advective energy and latent heat of evaporation by the Bowen Ratio were measured and/or determined. Aerodynamic transport coefficients were measured. Grain sorghum in 45 cm rows and peanuts in 30 cm north-south rows had the lowest evapotranspiration (ET) in 5 of 7 periods of measurement. During periods of moderate to high evaporative demand the ET from the narrow-row treatments was heavily influenced by advective energy and some (apparently physiological) effects which caused a depression in ET during the day. North-south rows during high evaporative demand showed evidence of early stomatal closure. Also north-south rows showed signs of generating greater turbulent transfer of heat. This combination seemed to advect heat away during periods of high stress. During periods of low evaporative demand the ET was nearly equal to net radiation and narrow north-south rows were not necessarily the lowest in ET.
W77-03169

THE REGULATION OF TRANSPIRATION EXPENDITURE OF MOISTURE BY PLANTS WITH THE AID OF ANTITRANSPIRANTS, (IN RUSSIAN),
Moskovskii Lesotekhnicheskii Institut (USSR).
For primary bibliographic entry see Field 3B.
W77-03475

VEGETATIVE WATER USE IN CALIFORNIA, 1974.
California State Dept. of Water Resources, Sacramento. Water Use Programs.
For primary bibliographic entry see Field 3F.
W77-03554

2E. Streamflow and Runoff

MINIMUM UNIT STREAM POWER AND FLUVIAL HYDRAULICS,
Corps of Engineers, Chicago, Ill. North Central Div.
For primary bibliographic entry see Field 8B.
W77-03080

FLOW AND BED TOPOGRAPHY IN CURVED OPEN CHANNELS,
Tokyo Inst. of Tech. (Japan). Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W77-03084

EXACT SOLUTION OF GRADUALLY VARIED FLOW,
Ahmadu Bello Univ., Zaria (Nigeria). Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W77-03085

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT, VOLUME 5, HYPOTHETICAL FLOODS,
Hydrologic Engineering Center, Davis, Calif.
For primary bibliographic entry see Field 8B.
W77-03104

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT, VOLUME 6, WATER SURFACE PROFILES,
Hydrologic Engineering Center, Davis, Calif.
For primary bibliographic entry see Field 8B.
W77-03105

STATE AND COUNTY AREA TABULATIONS FOR THE COLORADO RIVER BASIN,
Public Health Service, Denver, Colo. Div. of Water Supply and Pollution Control.

For primary bibliographic entry see Field 7C.
W77-03110

GUIDELINES FOR FLASH FLOOD AND SMALL TRIBUTARY FLOOD PREDICTION,
National Weather Service, Kansas City, Mo. Central Region.
For primary bibliographic entry see Field 4A.
W77-03114

OPTRM - A HYDROLOGIC TRANSPORT MODEL WITH PARAMETER OPTIMIZATION,
Oak Ridge National Lab. Tenn.
For primary bibliographic entry see Field 5B.
W77-03115

THE UNIT HYDROGRAPH: A SATISFACTORY MODEL OF WATERSHED RESPONSE,
Massey Univ., Palmerston North (New Zealand). Dept. of Geography.
For primary bibliographic entry see Field 4D.
W77-03126

FLOW DYNAMICS OF THE NEUSE RIVER ESTUARY,
North Carolina State Univ., Raleigh. Dept. of Geosciences.
For primary bibliographic entry see Field 2L.
W77-03300

WET AND DRY PERIODS OF ANNUAL FLOW SERIES,
Technical Univ. of Istanbul (Turkey). Dept. of Hydraulic and Water Power; and Technical Univ. of Istanbul (Turkey). Dept. of Civil Engineering.
Z. Sen.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 102, No. HY10, Proceedings Paper 12457, p 1503-1514, October 1976. 2 fig, 3 tab, 7 ref, 2 append.

Descriptors: *Droughts, *Floods, *Hydrologic data, Hydrology, Markov processes, Probability, Wet seasons, Statistical methods, Dry seasons, Flow, Correlation analysis.
Identifiers: *Probability theory, *Statistical analysis, Annual flow series, Probabilistic properties, Statistical properties, Correlation coefficient.

A methodology for calculating analytically various probabilities and statistical properties of run lengths of annual hydrological data was developed and applied to the first order Markov processes. In deriving the analytical expressions, the sequential property of the Markovian variables, which reduced the multivariate integral equation into multiplication of various bivariate integrals, was used extensively. Tables were provided for the mean variance coefficient of skewness and coefficient of variation of positive run lengths at various truncation levels and first order serial correlation coefficient. It was observed that run length properties of the Markov processes were the functions of truncation level and first order serial correlation coefficient only. As the serial correlation coefficient increased, the positive run length also increased. (Roberts-ISWS)
W77-03319

FLOODFLOW CHARACTERISTICS AT PROPOSED BRIDGE SITE ABOVE SHERWOOD ROAD ON WEST BRANCH DELAWARE RIVER, DELHI, NEW YORK,
Geological Survey, Albany, N. Y. Water Resources Div.
For primary bibliographic entry see Field 4A.
W77-03337

DEPTH AND FREQUENCY OF FLOODS IN ILLINOIS,
Geological Survey, Champaign, Ill. Water Resources Div.
B. J. Prugh, Jr.
Illinois Department of Transportation, Springfield, Division of Water Resources report, 1976. 26 p, 6 fig, 5 tab, 11 ref.

Descriptors: *Flood forecasting, *Flood frequency, *Flood recurrence interval, *Regression analysis, *Illinois, Channel morphology, Streamflow, Flow rates, Gaging stations, Flood plain zoning, Flood plain insurance, Rainfall-runoff relationships, Natural flow.
Identifiers: *2-, 5-, 10-, 25-, 50-, 100-year floods.

A method is presented for estimating flood depths of 2-, 5-, 10-, 25-, 50-, and 100-year frequency at ungaged sites in Illinois. Data from 177 U.S. Geological Survey gaging sites in Illinois were analyzed by multiple-regression techniques. Equations to predict depth of water above channel bottom for various frequency floods were developed. The 2-year-flood discharge was used as the descriptive variable. The depth-frequency equations assume normal rainfall-runoff relationships and should be used only for Illinois streams flowing under natural conditions. They do not apply to streams affected by backwater, or significant artificial controls, or in situations where ice or debris jams cause peak stages. (Woodard-USGS)
W77-03346

2F. Groundwater

A THREE-DIMENSIONAL FINITE ELEMENT GROUND WATER MODEL,
California Univ., Davis. Water Science and Engineering Section.
S. K. Gupta, K. K. Tanji, and J. N. Luthin.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-248 925, Price codes: A07 in paper copy, A01 in microfiche. UCAL-WRC-C-152, November 1975. 126 p, 24 fig, 5 tab, 127 ref, append.

Descriptors: *Mathematical models, *Groundwater, *Aquifers, *California, Aquifer systems, Computer programs, Groundwater basins, *Finite element analysis, Equations, Groundwater movement, Aquifer characteristics, Dispersion, Diffusion, Boundaries(Surfaces), Mass transfer.
Identifiers: *Galerkin technique, *Core storage, *Sutter Basin, *Three-dimensional models.

The capability of a three-dimensional model developed in this study was demonstrated by applying it to a real world groundwater system of complex geometry, material characteristics, and initial and boundary conditions. The model used three-dimensional isoparametric elements that can be deformed in x, y, and z directions to handle any type of multi-aquifer geometry in a most economical manner, i.e., higher order elements are required for curved boundaries and lower order for the rest of the region. Other highlights and main features are: (1) core storage requirement is reduced to a minimum by using disk or tape, and also by the use of 'compressed' stiffness matrix; (2) parameters repeatedly required are estimated only once and stored on disk; and (3) different conditions encountered in real world problems and transient cases are handled by executing only the pertinent subprograms. (Visocky-ISWS)
W77-03109

PERMEABILITY AND GROUND WATER CIRCULATION IN THE MADISON AQUIFER ALONG THE EASTERN FLANK OF THE BIGHORN MOUNTAINS OF WYOMING,
Wyoming Univ., Laramie. Dept. of Geology; and Wyoming Univ., Laramie. Water Resources Research Inst.
P. W. Huntoon.
In: 28th Annual Field Conference--1976, Wyoming Geological Association Guidebook, p 283-290, 3 fig, 2 tab, 14 ref. OWRT A-019-WYO(3), 14-31-0001-4051,5051,6053.

Descriptors: *Aquifers, *Permeability, *Groundwater recharge, *Wyoming, Groundwater movement.
Identifiers: *Bighorn Mountain range(Wyo), *Madison aquifer(Wyo).

The observed permeability characteristics of the Paleozoic rocks that comprise the Madison aquifer in outcrops along the eastern flank of the Bighorn range are described. The analysis, though qualitative, will help to identify the types of geologic environments in the Powder River Basin where there is potential for ground water production. A second objective is to present in summary fashion the results of quantitative estimates of ground water recharge to the Madison aquifer along the eastern flank of the Bighorn range in Wyoming.
W77-03122

THE OCCURRENCE OF GROUNDWATER IN THE SATPURA REGION OF CENTRAL INDIA,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 4B.
W77-03146

HYDROGEOLOGY OF THE MISSOURI RIVER FLOOD PLAIN NEAR GLASGOW, MISSOURI,
Missouri Univ., Columbia. Dept. of Geology.
N. G. Grannemann.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 215, Price codes: A06 in paper copy, A01 in microfiche. M. A. Thesis, December 1976. 98 p, 49 fig, 1 tab, 45 ref, 3 append. OWRT A-085-MO(2). 14-34-0001-6026

Descriptors: *Missouri River, *Flood plains, *Alluvial aquifers, *Mathematical models, Bank storage, *Groundwater, Water levels, Alluvium, Rivers, *Hydrogeology, *Missouri, *Monitoring.

A combination study of field investigation, year-long monitoring of river stage and ground-water conditions, and mathematical modeling provided insights into the unexpected variability of flood-plain hydrogeology. The ground-water system reflects a continuum of change rather than variations from a steady-state condition. Factors controlling ground-water levels are: distance from the river, time since any change in river stage, the geometry of river meanders and valley walls, inhomogeneities in top stratum materials, position of tributary creeks and whether these creeks are influent or effluent, long-term ground-water levels near valley walls, and pumping. It was possible to separate the flood-plain study area into four types of ground-water response: areas of continuing ground-water high, areas of predominantly down valley flow, areas of slow ground-water response, and areas of rapidly fluctuating ground-water levels. River ground-water interactions were found to be predominantly effluent, predominantly influent, or alternating influent-effluent. Examination of field data cast serious doubts on the validity of common bank-storage model assumptions. Major alluvial aquifers are inhomogeneous and may be confined and/or unconfined. Furthermore, the Dupuit-Forcheimer conditions are not valid nor is the assumption of fully penetrating streams. The lower Missouri River Valley alluvium represents a major, but relatively little used aquifer.
W77-03164

NORMAL-MODE ANALYSIS OF THE STRUCTURE OF BASEFLOW RECESSION CURVES,
Department of the Environment, Reading (England). Central Water Planning Unit.
D. A. Nutbrown, and R. A. Downing.
Journal of Hydrology, Vol. 30, No. 4, p 327-340, 1976. 6 fig, 1 tab, 8 ref, 1 append.

Descriptors: *Groundwater, *Base flow, *Recession curves, *Flow separation, *Surface-

roundwater relationships, Hydrology, Aquifer haracteristics, Subsurface flow, Mathematical odels, Subsurface runoff, Equations, Mathematical studies.
lentifiers: *Base flow separation, *Base flow cession, *United Kingdom, Groundwater stems.

the United Kingdom, semi-logarithmic plots of e baseflow recession for streams which partially enetrate aquifers are frequently not single raight line plots. Modeling studies indicated that is behavior, for typical values of aquifer parameers occurs for even the simplest of groundwater stems. The baseflow component arising from ven a simple aquifer should be viewed as a superosition of many, distinct exponential terms. The rigin of these terms was shown to arise purely om the dynamics of groundwater flow. A form of e baseflow recession was used to perform empiral fits to observed data. (Terstriep-ISWS)
77-03313

EASURED AND SIMULATED GROUND-ATER LEVELS IN THE FRANKLIN AREA, OUTHEASTERN VIRGINIA,
eological Survey, Albany, N. Y. Water esources Div.
or primary bibliographic entry see Field 7C.
77-03326

UPPLEMENT TO DOCUMENTATION OF INITE-DIFFERENCE MODEL FOR SIMULAION OF THREE-DIMENSIONAL GROUND-ATER FLOW,
eological Survey, Reston, Va. Water Resources iv.
. C. Trescott, and S. P. Larson.
pen-file report 76-591, August 1976. 20 p, 3 fig, 4 f.

escriptors: *Computer models, *Groundwater ovement, *Saturated flow, *Finite element analsis, Simulation analysis, Equations, Methodoloy.

ser experience has indicated that the documentaon of the model of three-dimensional groundater flow (Trescott and Larson, 1975) should be xpanded. This supplement is intended to fulfill at need. The original report emphasized the eory of the strongly implicit procedure, instrucons for using the groundwater-flow model, and ractical considerations for application. (See also 76-02962 and W76-13085) (Woodard-USGS)
77-03329

ROUND-WATER LEVELS IN NEW MEXICO, 975,
eological Survey, Albuquerque, N. Mex. Water esources Div.
or primary bibliographic entry see Field 7C.
77-03330

YDRAULIC CHARACTERISTICS OF THE INEY POINT AQUIFER AND OVERLYING ONFINING BED NEAR DOVER, DELAWARE,
eological Survey, Parkville, Md. Water esources Div.
. P. Leahy.
elaware Geological Survey, Newark, Report of ivestigations No 26, June 1976. 24 p, 6 fig, 6 tab, 4 ref, append.

escriptors: *Aquifer characteristics, *Hydraulic roperties, *Delaware, Data collections, lethodology, Transmissivity, Storage coefficient, rawdown, Model studies.
lentifiers: *Piney Point aquifer(Del).

he hydraulic properties of the Piney Point Eocene) aquifer and overlying basal silt of the hesapeake Group (Miocene) were determined by 23-day aquifer test conducted at the Danner Farm Well Field of the City of Dover, Delaware. During the test, head changes were monitored continuously in the Piney Point aquifer, overlying Cheswold (Miocene) aquifer, and the intervening confining bed. Based on an analysis assuming leaky artesian conditions, the transmissivity and storage coefficient of the aquifer are 4,100 sq ft/d and 0.00030, respectively. The confining bed hydraulic properties were determined using a combination of the following methods: (1) analysis of drawdown data in the aquifer by the Hantush leaky artesian type curves, (2) determination of hydraulic diffusivity based on the ratio of head changes in the aquifer to head changes in the confining bed, and (3) analysis of head changes in the confining bed by use of theoretical response curves to determine hydraulic diffusivity. Vertical conductivity cannot be determined directly from any one of these techniques. However, combined use of the methods indicated that the vertical conductivity of the confining bed ranges from 0.000040 to 0.000090. The range of values for specific storage is 0.0000030 to 0.0000060/ft. These values will be used in a digital model to determine leakage to the Piney Point aquifer in the Dover area. (Woodard-USGS)
W77-03331

BURIED AQUIFERS IN THE BROOTEN-BELGRADE AND LAKE EMILY AREAS, WEST-CENTRAL MINNESOTA--FACTORS RELATED TO DEVELOPING WATER FOR IRRIGATION,
Geological Survey, St. Paul, Minn. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-03335

APPRAISAL OF WATER RESOURCES IN THE HACKENSACK RIVER BASIN, NEW JERSEY,
Geological Survey, Trenton, N. J. Water Resources Div.
L. D. Carswell.
Water-Resources Investigations 76-74, June 1976. 68 p, 18 fig, 1 plate, 2 tab, 38 ref.

Descriptors: *Groundwater resources, *Aquifer characteristics, *Well data, *Water yield, *Water quality, *New Jersey, Hydrogeology, Geologic mapping, Groundwater movement, Saline water intrusion.
Identifiers: *Hackensack River basin(NJ), Brunswick formation.

Bedrock in the Hackensack River basin, New Jersey, the Newark Group of Triassic age, is composed of diabase, sandstone, conglomerate, and shale. The Brunswick Formation is the only important bedrock aquifer in the basin. Water occurs in this aquifer in joints and fractures, generally within 200 feet of land surface in lowland areas and within 500 feet in upland areas. Yields of wells tapping the Brunswick are up to 600 gal/min; the median yield is 100 gal/min. The formation is anisotropic; the greatest permeability is parallel to the strike of bedding. The Newark Group is overlain by unconsolidated deposits of Quaternary age. Sand and gravel aquifers locally yield large quantities of water (greater than 300 gal/min) to wells. Water in the Brunswick Formation is relatively low in dissolved minerals in the upper area of the basin. In the lower area, water in the Brunswick is highly mineralized: specific conductance ranges from 579 to 3,480 micromhos per cubic centimeter; chloride ranges from 19 to 755 mg/liter; and sulfate ranges from 87 to 966 mg/per liter. Chemical quality in the lower area is affected by induced recharge of poor quality surface water. Surface water quality is influenced by tidal flooding and disposal of sewage and industrial wastes. (Woodard-USGS)
W77-03336

CHEMICAL COMPOSITION DATA AND CALCULATED AQUIFER TEMPERATURE FOR SELECTED WELLS AND SPRINGS OF HONEY LAKE VALLEY, CALIFORNIA.
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 2K.
W77-03342

HIGH-RESOLUTION SEISMIC REFLECTION PROFILING FOR MAPPING SHALLOW AQUIFERS IN LEE COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla. Water Resources Div.
For primary bibliographic entry see Field 7B.
W77-03344

SUMMARY OF GEOLOGY AND GROUND-WATER RESOURCES OF PASSAIC COUNTY, NEW JERSEY,
Geological Survey, Trenton, N.J. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-03345

GROUND-WATER RESOURCES OF GREELEY AND WICHITA COUNTIES, WESTERN KANSAS,
Geological Survey, Lawrence, Kans. Water Resources Div.; and Geological Survey, Lawrence, Kans.
For primary bibliographic entry see Field 4B.
W77-03347

PROBABLE MAXIMUM FLOOD AT LAKE CHIPPEWA NEAR WINTER, WISCONSIN,
Geological Survey, Madison, Wis. Water Resources Div.
For primary bibliographic entry see Field 4A.
W77-03349

2G. Water In Soils

UNDRAINED BEHAVIOR OF EMBANKMENTS ON NEW LISKEARD VARVED CLAY,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering: and Massachusetts Inst. of Tech., Cambridge. Constructed Facilities Div.
For primary bibliographic entry see Field 8D.
W77-03108

PIPING IN EARTH DAMS CONSTRUCTED OF DISPERSIVE CLAY; LITERATURE REVIEW AND DESIGN OF LABORATORY TESTS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Soils and Pavements Lab.
For primary bibliographic entry see Field 8D.
W77-03112

FACTORS OF SOIL SALINIZATION DURING IRRIGATION IN THE TURAN LOWLAND, (IN RUSSIAN),
V. M. Borovskii.
Izv Akad Nauk Kaz Ssr Ser Biol 13(4), p 1-8, 1975.

Descriptors: *Saline soils, Irrigation, Salts, Soil drainage, Irrigated lands, Drainage systems.
Identifiers: Turan, *USSR.

More than 60% of the irrigated lands of the USSR is located in the Turan lowland, a vast region from the coast of the Caspian Sea to the valley of Ili River on the border of China. The stratum in which water-soluble salts migrate has a thickness up to 100 m. The accumulation of salts in soils, rocks and waters is related with the natural drainage conditions. In regulating the water-salt regime by means of drainage systems and flushings, the salt resources and hydrophysical properties of the entire stratum must be considered.--Copyright 1976, Biological Abstracts, Inc.
W77-03124

THE TRANSPORT OF POLLUTANTS IN GROUND WATER, (IN GERMAN),
California Univ., Riverside. Dept. of Soil Science and Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W77-03131

AFFORESTATION IN LOW RAINFALL AREAS,
Department of Forestry, Pretoria (South Africa).
For primary bibliographic entry see Field 4D.
W77-03139

ON THE VALIDITY OF THE THEORY OF FLOW IN SATURATED SWELLING MATERIALS,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Environmental Mechanics.
D. E. Smiles.
Australian Journal of Soil Research, Vol. 14, No. 3, p. 389-395, October 1976. 4 fig, 2 tab, 7 ref.

Descriptors: *Saturated flow, *Soil water movement, *Mathematical studies, *Expansive soils, Hydraulic conductivity, Moisture content, Porous media, Soil physical properties.
Identifiers: Swelling materials.

Recently there has been concern that the reorientation of particles during transient flow of water in a saturated swelling materil might result in the hydraulic conductivity and capillary potential not being well-defined functions of the water content. If this were the case, the conventional theory of one-dimensional liquid flow in these materials would be invalid. It is shown that the hydraulic conductivity - water content relationship calculated using physically based approximate theory applied to outflow data obtained from red mud, is single-valued and independent of initial water content. Furthermore, the relationship permits recalculation, using a correct iterative procedure, of the data from which it was derived. It is concluded that the data provide no evidence to reject the theory, and that particle reorientation, if it occurs, is parameterized by the water content. (CSIRO)
W77-03280

INFILTRATION AND WATER MOVEMENT IN AN IN SITU SWELLING SOIL DURING PROLONGED PONDING,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Environmental Mechanics.
T. Talsma, and A. van der Leij.
Australian Journal of Soil Research, Vol. 14, No. 3, p. 337-349, October 1976. 8 fig, 2 tab, 18 ref.

Descriptors: *Infiltration, *Soil water movement, *Expansive soils, Soil physical properties, Soil density, Soil moisture, Hydraulic conductivity, Tensiometers.
Identifiers: Swelling soils.

Measurements of infiltration, moisture content, soil water potential, hydraulic conductivity, bulk density, vertical swelling, and the effect of overburden on tensiometer readings, were made over 120 days on a swelling clay soil ponded for rice growing. Infiltration was rapid and water penetrated deeply on the first ponding day. Measured infiltration from 1 to 45 days after ponding corresponded well with theoretical expectations. From 45 to 120 days, the development of a time-variable flow restriction near the soil surface prevented the attainment of a final, steady infiltration rate. During ponding a transient water table developed, moisture profiles were distinctly hydric, and seepage to a deep water table or aquifer was not negligible. Core sample values of hydraulic conductivity agreed with those obtained from mean flux and potential gradients, although conductivity and infiltration rate varied greatly from place to place. Measured swelling agreed favourably with that calculated from bulk density changes. Indications were obtained that the effect of overburden potential on flow was not large. (CSIRO)
W77-03281

SIMULATION OF FIELD WATER UPTAKE BY PLANTS USING A SOIL WATER DEPENDENT ROOT EXTRACTION FUNCTION,
Institute for Land and Water Management Research, Wageningen (Netherlands).
R. A. Feddes, P. Kowalik, K. Kolinska-Malinka, and H. Zaradny.
Journal of Hydrology, Vol. 31, No. 1/2, p 13-26, September 1976. 10 fig, 1 tab, 16 ref.

Descriptors: *Mathematical models, *Absorption, *Soil-water-plant relationships, *Soil water, *Root systems, Root zone, Pressure head, Hydraulic conductivity, Moisture content, Water balance, On-site data collections, Depth, Equations, Aeration, Soil water movement, Soil gases, Water table, Numerical analysis.
Identifiers: Sink term, Empirical function, Implicit finite-difference model, Oxygen diffusion rate.

Water uptake by roots can be represented by adding a volumetric sink term to the continuity equation for soil water flow. This sink term is often expressed as a product of the difference in pressure head between the soil and the root - soil interface, the hydraulic conductivity of the soil, and some empirical root function. Because of the amount of field work and experimental difficulties involved in determining this root function, an attempt was made to describe the sink term with a simpler expression. In this approach, the sink term was considered to be a function of the soil water content, varying with the latter according to the pressure heads generally known to be critical for water uptake by the roots. An implicit finite-difference model was developed and verified with results obtained experimentally in the field from water balance studies. Although the model does not predict the distribution of soil water content with depth in very accurate detail, the cumulative effect over the entire depth is properly simulated. Comparison of the results of the simpler model with those of the model of Feddes, Bresler, and Neuman, led to the conclusion that both models yield similar results. (Visocky-ISWS)
W77-03315

MEASUREMENT OF NONEXCHANGING PORES DURING MISCIBLE DISPLACEMENT IN SOILS,
Massachusetts Agricultural Experiment Station, Amherst.
O. L. Weeks, G. L. Stewart, and M. E. Weeks.
Soil Science, Vol. 122, No. 3, p 139-144, September 1976. 3 fig, 6 tab, 7 ref.

Descriptors: *Porosity, *Soils, *Analytical techniques, *Instrumentation, Measurement, Soil types, Tritium, Tracers, Diffusion, Pores, Vacuum drying, Distillation.
Identifiers: *Miscible displacement, *Effective porosity, Soil columns.

A simple tritium tracer-vacuum distillation technique was used to determine the percent nonexchanging pores in soils during miscible displacement. Data for soil columns packed with three different soil types were presented and compared with the results of previously reported values. After two pore volumes of displacement, only 1 to 2% of the pore water had not exchanged with the displacing fluid. Previously published work, based upon either mathematical models or experimental data, showed considerably greater values for nonconducting pores in soils. The time required for two pore volumes of displacement in the packed soil columns was sufficient for diffusion of tracer into essentially all of the slowly conducting and nonconducting pores. (Visocky-ISWS)
W77-03320

CALIBRATION OF NEUTRON PROBE I SOME SELECTED HAWAIIAN SOILS,
Hawaiian Sugar Planter' Association Experimer Station, Honolulu.
G. A. Shirazi, and M. Isobe.
Soil Science, Vol. 122, No. 3, p 165-170, Sep tember 1976. 3 fig, 2 tab, 15 ref.

Descriptors: *Nuclear meters, *Soils, *Neutro absorption, *Hawaii, Depth, *Calibration *Instrumentation, *Measurement, Soil moistur Laboratory tests.
Identifiers: *Neutron probes.

An investigation was conducted in a laborato with an N-104A (Troxler) neutron probe to con pare the calibration curves of different soil mate als, to determine the depth of maximum resol tion, and to define the sphere of importanc Statistical tests of regression lines, relating rel tive counts to volumetric moisture content, i dicated that the calibrations for the three materia (silty clay soil, Catano sand, and silica sand) di fered from one another. Based on the findings wi silica and Catano sand, it was concluded that th sphere of importance is within a radius of only to 18 cm, and the depth of maximum resolution 15 cm when measured from the end of the prob (Visocky-ISWS)
W77-03321

REACTIONS OF HEAVY METALS WIT SOILS WITH SPECIAL REGARD TO THEI APPLICATION IN SEWAGE WASTES,
Melbourne Univ., Parkville (Australia). Dept. Agricultural Chemistry.
For primary bibliographic entry see Field 5B.
W77-03359

SOIL POTASSIUM RELATIONSHIPS AS IN DICATED BY SOLUTION EQUILIBRATION AND PLANT UPTAKE,
Ohio State Univ., Columbus. Dept. of Agronomy.
D. A. Munn, and E. O. McLean.
Soil Science Society of America Proceedings, Vo 39, No. 6, p 1072-1076, November-December 197 2 fig, 7 tab, 17 ref.

Descriptors: *Potassium, *Corn(Field), *Ohi Soils, Soil investigations, Soil chemistry Nutrients, Fertilizer, Fertilization.

Four Ohio soils of wide range in K release capa bility were initially K-treated and successivel cropped three times with corn in a growt chamber. Aliquots of the soils with and without added and before and after cropping were assaye by extraction, equilibration, and plant uptak techniques for the effects of cropping and K-trea ment. Uptake of K by the corn was closely relate to the K release capabilities of the soil Exchangeable K increased as rate of K increase Initial cropping decreased the exchangeable K all soils eliminating the effect of K treatments o exchangeable K. However, after initial croppin where no K was added, exchangeable K varie sixfold from the lowest to the highest. (Skogerboe Colo St)
W77-03395

EFFECT OF ADDED SALTS ON NITROGE RELEASED AND NITRATE LEVELS I FOREST SOILS OF THE WASHINGTO COASTAL AREA,
Western Washington Research and Extensio Center, Puyallup.
P. Heilman.
Soil Science Society of America Proceedings, Vol 39, No. 4, p 778-782, July-August 1975. 2 fig, 4 tab 20 ref.

Descriptors: *Nitrogen, *Nutrients, Salts, Salini ty, *Nitrates, Nitrification, *Washington, Coasts
Identifiers: *Mineralization, *Forest soils.

e release and mineralization of N was studied in ubated samples of 10 forested soils from the shington Coast which had been treated with a iety of salts. Salts were added in solution at 05, 0.05, and 0.2M concentrations and the sam- s were incubated at 27C for 7, 14, and 21 days. lease of NH4-N plus NO3-N increased with in- ase in the duration of incubation and concentra- n. The lowest concentration of salt increased N ease over that from distilled water. (Skogerboe- lo St)
7-03396

EDICTION OF WATER TRANSMISSION IN NDITIONED SOILS,
sconsin Univ. -Madison.
R. Gardner, and M. F. De Boodt.
ded Fac Landbouwwet Rijksuniv Gent., Vol No. 3, p 1150-1159, 1972.

scriptors: *Forecasting, *Soils, *Soil water vement, On-site Investigations, Methodology.

some system for screening possible soils to be ated or to be tested is not devised, it seems un- ely that those situations where soil conditioning most desirable will be found by trial and error. e expense of such field trials is simply too great ensure that the right combination of circum- nces will be found. How best to measure the le factor and the parameter n is not discussed re. It is hoped that at the conclusion of ongoing oratory studies it will be possible to make ecific recommendations as to suitable ocedures.--Copyright 1974, Biological Ab- acts, Inc.
7-03451

H. Lakes

STRIBUTION OF PELAGIC ZOOPLANKTON ITHIN A THERMAL GRADIENT IN LAKE OLUMBIA, A COOLING LAKE NEAR RTAGE, WISCONSIN,
sconsin Univ., Madison. Lab., of Limnology.
r primary bibliographic entry see Field 5C.
7-03077

STRIBUTION AND FEEDING OF PUMPKIN- ED (LEPOMIS GIBBOSUS) AND BLACK APPIE (POMOXIS NIGROMACULATUS) IN POWER PLANT COOLING LAKE,
sconsin Univ., Madison. Lab. of Limnology.
r primary bibliographic entry see Field 5C.
7-03078

OASTAL REGION RESIDENCE TIME ESTI- ATES FROM CONCENTRATION RADIENTS,
tario Ministry of the Environment, Toronto.
r primary bibliographic entry see Field 5C.
7-03093

PACTS OF THE DEPOSITION OF DREDGED OILS ON LAKE ERIE SEDIMENT QUALITY ID ASSOCIATED BIOTA,
te Univ. of New York Coll. at Buffalo. Great kes Lab.
r primary bibliographic entry see Field 5C.
7-03094

ACH PROCESSES, PERRIEN COUNTY, CHIGAN,
rida State Univ., Tallahassee. Dept. of Geolo-

r primary bibliographic entry see Field 2J.
7-03095

PRECIPITATION CHEMISTRY STUDIES AT LAKE GEORGE: ACID RAINS,
Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Chemical Engineering and Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Environmetal Engineering.
For primary bibliographic entry see Field 5A.
W77-03098

THE ILLINOIS COASTAL ZONE MANAGEMENT PROGRAM: FIRST YEAR WORK PRODUCT. VOLUME II. COASTAL GEOLOGICAL STUDIES.
Illinois State Geological Survey, Urbana.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-250 136, Price codes: A13 in paper copy, A01 in microfiche. FY1975 Report, October 1975. 285 p.

Descriptors: *Geology, *Erosion, *Geological surveys, *Lake Michigan, *Illinois, Surveys, Coasts, Shores, Lakes, Beaches, Beach erosion, Geologic investigations, Water levels, Storms, Waves(Water), Remote sensing, Satellites(Artificial).
Identifiers: *Bluffs, *Bluff erosion.

This report is the second volume of four dealing with the Illinois Coastal Zone Management Program. Included in this particular report are physical data prepared by the Illinois State Geological Survey for the time period FY1975. Included in the report are seven studies on different aspects of the Lake Michigan-Illinois shoreline. The studies offered data on the following: beach distribution and condition, distribution and levels of erosion, conditions of shore stability, distribution and kinds of shore protection, and areas and conditions of hazard. These categories were subdivided and grouped by political units, thereby providing a summary of shore conditions and problems for each community. All of the studies reported here continue along with the new projects begun in FY1976. (See also W76-12686) (Sims-ISWS)
W77-03103

BIOGEOCHEMICAL DEVELOPMENT OF THE LAKE OF GENEVA (SWITZERLAND) FROM 1957 TO 1973: PART III, (IN FRENCH),
Paris Univ., Thonon-les-Bains (France). Center for Geodynamic Research.
For primary bibliographic entry see Field 5C.
W77-03144

THE RELATIONSHIP OF BOTTOM SEDIMENTS TO BACTERIAL WATER QUALITY IN A RECREATIONAL SWIMMING AREA,
Arizona Univ., Tucson. School of Renewable Natural Resources.
For primary bibliographic entry see Field 5B.
W77-03167

HEAVY METALS IN LAKES OF THE COEUR D'ALENE RIVER VALLEY, IDAHO,
Idaho Univ., Moscow. Dept. of Zoology.
For primary bibliographic entry see Field 5B.
W77-03207

PHYSIOCHEMICAL AND BIOLOGICAL CONDITIONS IN TWO OKLAHOMA RESERVOIRS UNDERGOING ARTIFICIAL DESTRATIFICATION,
Oklahoma State Univ., Stillwater. Dept. of Agriculture Engineering.
J. E. Garton, R. C. Summerfelt, D. W. Toetz, J. L. Wilhm, and H. R. Jarrell.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 365, Price codes: A07 in paper copy, A01 in microfiche. Oklahoma Water Resources Research Institute, Stillwater, July 1976. 138 p, 33 fig, 35 tab, 103 ref. OWRT C-5228 (No. 4215)(3) and A-028-OKLA(2), A-044-OKLA(3), A-048-OKLA(2), A-050-OKLA(4), A-052-OKLA(1), A-059-OKLA(3).

Descriptors: Stratification, *Physicochemical properties, Algae, Zooplankton, Invertebrates, Benthos, Lakes, *Oklahoma, Reservoirs, *Destratification, *Biological properties, *Pumps, *Pumping, Aeration, Fish, Growth rates, Distribution.
Identifiers: Lake of the Arbuckles(Okla), Ham's Lake(Okla).

A 1.83 m pump was used to destratify a 40 ha lake (Ham's Lake, Oklahoma) which was 9.5 m deep. This 1 hp device was able to destratify the lake in about one week. The effects of the pump operation on physicochemical variables were determined. Algae species composition and density, zooplankton species composition and diversity, benthic macroinvertebrates species composition, diversity and density, and the distribution and growth of fish were measured. A 5 m pump was used on a lake (Lake of the Arbuckles, Oklahoma) with 23 times the area and 3 times the depth of Ham's Lake. The same parameters were measured. The device caused the lake to turnover 1 month earlier and more completely than in previous years. This pump has the capability of increasing the oxygen content of waters being released without destratifying a lake.
W77-03208

BIOLOGICAL AND CHEMICAL EVALUATION OF THE AQUATIC ENVIRONMENT OF SELECTED UNDEVELOPED KENTUCKY LAKE EMBAYMENTS,
Kentucky Water Resources Research Inst., Lexington.
For primary bibliographic entry see Field 5C.
W77-03209

ORGANIC PHOSPHORUS IN LAKES,
Wisconsin Univ., Madison. Water Chemistry Lab.
For primary bibliographic entry see Field 5C.
W77-03210

ASPECTS OF THE CHEMICAL VARIABILITY OF SOME TASMANIAN INLAND WATERS (AUSTRALIA),
Tasmania Univ., Hobart (Australia). Dept. of Botany.
For primary bibliographic entry see Field 2K.
W77-03283

CHEMISTRY OF SALT LAKES AND OTHER WATERS IN THE SUB-HUMID REGIONS OF TASMANIA (AUSTRALIA),
Tasmania Univ., Hobart (Australia). Dept. of Botany.
R. T. Buckney, and P. A. Tyler.
Australian Journal of Marine and Freshwater Research, Vol. 27, No. 3, p. 359-366, September 1976. 3 fig, 4 tab, 32 ref.

Descriptors: *Saline lakes, *Water chemistry, *Australia, Surface waters, Ions, Surveys, Lagoons, Salinity, Climates.
Identifiers: *Tasmania.

Within a large area of Tasmania, described as the sub-humid province, annual evaporation exceeds precipitation, so that closed saline lakes may occur. Analyses are presented of the major chemical features of pans and lagoons within this region. The waters sampled are classed as fresh or saline, using a criterion which is a function of relative ionic composition. Saline waters are regarded as having ionic composition limited by the solubility of alkaline earth carbohydrates, and they have a composition akin to that of sea water. The fauna of salt pans is briefly mentioned, and some relationships between ionic concentrations and other chemical parameters are reassessed for the entire salinity range of Tasmanian inland waters. (CSIRO)
W77-03284

STABILITY OF IONIC PROPORTIONS IN FIVE SALT LAKES IN VICTORIA, AUSTRALIA,
Adelaide Univ. (Australia). Dept. of Zoology.
W. D. Williams, and R. T. Buckney.
Australian Journal of Marine and Freshwater Research, Vol. 27, No. 3, p. 367-377, September 1976. 6 fig, 3 tab, 28 ref.

Descriptors: *Saline lakes, *Australia, *Ions, Salinity, Water chemistry, Seasonal, Variability, Ecology, Physicochemical properties.
Identifiers: *Victoria.

Variability is the most salient feature of the physicochemistry of inland salt lakes, and is of fundamental ecological importance. As differences in ionic proportions have an influence on some components of the faunas of salt lakes, an investigation was undertaken to assess seasonal variation in some saline Victorian lakes whose ecology is also under study. Samples taken approximately monthly over a four-year period show that although total salt concentration varied widely in all lakes the ionic proportions of major cations and anions were remarkably constant. (CSIRO)
W77-03285

CHEMICAL COMPOSITION OF SOME INLAND SURFACE WATERS IN SOUTH, WESTERN, AND NORTHERN AUSTRALIA,
Adelaide Univ. (Australia). Dept. of Zoology.
For primary bibliographic entry see Field 2K.
W77-03286

WIND-INDUCED WATER LEVEL OSCILLATIONS IN SHALLOW LAGOONS,
Adelaide Univ., (Australia). Dept. of Applied Mathematics.
B. J. Noye, and P. J. Walsh.
Australian Journal of Marine and Freshwater Research, Vol. 27, No. 3, p. 417-430, September 1976. 9 fig, 16 ref.

Descriptors: *Water level fluctuations, *Lakes, *Winds, Waves(Water), Lagoons, *Australia, Mathematical studies.
Identifiers: Shallow lagoons.

Use is made of the concept of the frequency response function to analyse long-wave oscillations of the surface of a closed lake which is subject to forcing by tangential wind stresses. By comparison of a response function calculated from data taken from the North Coorong - an almost land-locked lagoon south of Adelaide, South Australia - with the theoretical, one-dimensional response calculated for a rectangular, constant-depth lake with dimensions equivalent to the average dimensions of this body of water, an estimate is made of the damping parameter for the lagoon. Predictions of wind-induced water level changes using the response function method agree well with recorded values. (CSIRO)
W77-03287

THE CLASSIFICATION AND GEOMORPHIC IMPLICATIONS OF THAW LAKES ON THE ARCTIC COASTAL PLAIN, ALASKA,
Cold Regions Research and Engineering Lab., Hanover, N.H. Northern Engineering Research Branch.
For primary bibliographic entry see Field 2C.
W77-03296

LANDSLIDE GENERATED WATER WAVE MODEL,
Alabama Univ., University. Dept. of Engineering Mechanics.
For primary bibliographic entry see Field 8B.
W77-03318

PROBABLE MAXIMUM FLOOD AT LAKE CHIPPEWA NEAR WINTER, WISCONSIN,
Geological Survey, Madison, Wis. Water Resources Div.
For primary bibliographic entry see Field 4A.
W77-03349

DATA ON SELECTED LAKES IN WASHINGTON, PART 5,
Geological Survey, Tacoma, Wash. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-03350

THE EFFECTS OF SEWAGE EFFLUENT ON WETLAND ECOSYSTEMS,
Michigan Univ., Ann Arbor.
For primary bibliographic entry see Field 5C.
W77-03354

EXPERIMENTAL STUDIES ON MATERIAL TRANSACTIONS BETWEEN MUD AND WATER OF THE GNADENSEE,
For primary bibliographic entry see Field 5C.
W77-03370

REPORT ON POLLUTION IN LAS VEGAS WASH AND LAS VEGAS BAY.
Federal Water Pollution Control Administration, Cincinnati, Ohio. Div. of Technical Services.
For primary bibliographic entry see Field 5C.
W77-03371

EVALUATION OF LAKE MILNER WATER QUALITY MODEL,
Environmental Protection Agency, Seattle, Wash.
For primary bibliographic entry see Field 5B.
W77-03373

THE PRIMARY PRODUCTION OF THE PERIPHYTON ASSOCIATION OEDOGONIO-EPITHEMIETUM LITORALAE,
For primary bibliographic entry see Field 5C.
W77-03374

THE IMPACT OF A FOREST FIRE ON A WILDERNESS LAKE IN NORTHEASTERN MINNESOTA,
Minnesota Univ., Minneapolis. Limnological Research Center.
For primary bibliographic entry see Field 5B.
W77-03375

THE PRIMARY PRODUCTION OF LAKE SIBAYA, KWAZULU, SOUTH AFRICA,
For primary bibliographic entry see Field 5C.
W77-03376

LAKE PHOSPHORUS LOADING GRAPHS: AN ALTERNATIVE,
Environmental Protection Agency, Corvallis, Oreg. Eutrophication and Lake Restoration Branch.
For primary bibliographic entry see Field 5C.
W77-03377

WATER QUALITY IN THE CALUMET AREA. CONFERENCE ON POLLUTION OF LOWER LAKE MICHIGAN, CALUMET RIVER, GRAND CALUMET RIVER, LITTLE CALUMET RIVER, AND WOLF LAKE, ILLINOIS AND INDIANA.
Department of Health, Education, and Welfare, Washington, D.C. Technical Committee on Water Quality.
For primary bibliographic entry see Field 5B.
W77-03382

GREAT LAKES WATER QUALITY; FOURT ANNUAL REPORT TO THE INTERNATION JOINT COMMISSION.
International Joint Commission-United States a Canada. Great Lakes Water Quality Board.
For primary bibliographic entry see Field 5G.
W77-03383

A PRELIMINARY STUDY OF THE TASTE A ODOR PROBLEMS IN GRAND LAKE, OH AND THE WABASH RIVERS, INDIANA,
Federal Water Pollution Control Administrati Evansville, Ind. Ohio River Basin Project.
For primary bibliographic entry see Field 5C.
W77-03384

INVESTIGATIONS ON THE ROLE OF D SOLVED ORGANIC MATTER IN DETERMI ING ECOSYSTEM STRUCTURE AND FUN TION: THE PLANKTON A PHOTOHETEROTROPHY,
Michigan State Univ., East Lansing. Dept. Botany.
For primary bibliographic entry see Field 5C.
W77-03389

RESPONSE OF DAPHNIA POPULATION SI AND AGE STRUCTURE TO PREDATION,
Washington Univ., Seattle. Dept. of Zoology.
H. G. Hairston, Jr., and R. A. Pastorok
Available from the National Technical Inform tion Service, Springfield, VA 22161 as RLO 22 T234, Price codes: A02 in paper copy, A01 microfiche. 1975. 17 p, 4 fig, 2 tab, 11 ref. AT(1)-2225 TA 23.

Descriptors: *Predation, *Rainbow trout, *Mo studies, *Daphnia, Diptera, Prey fish, Compe tion, Secondary productivity, Ecology, Inv tebrates, Lakes, Simulation, Mathemati models, Zooplankton, *Michigan.
Identifiers: *Sporley Lake(Mich), Cascadi models.

Simulated application of a mathematical casca model of size-selective predation shows that t introduction of rainbow trout into Sporley La Michigan cannot be blamed for an observ demise of the lake's Daphnia population. The fin ing supports earlier research suggesting that oth fish entering the lake at the same time as the tro must have played an important role in the dyna ics of the Daphnia. The mathematical casca model is a population projection matrix in whi future population sizes and age structures can projected -- given the size, fecundity and survivo ship of each age class of a starting population. T model attempts to show how the preference predatory fish to feed on larger and older egg-bea ing species, compared with the preference of v vertebrate predators such as Chaeborus f smaller and younger zooplankton, affects a structure and numbers of a single species of pr population. A predation cascade is described, i cluding fish feeding preferences, changes in pred tion as related to decreasing numbers of availab prey, secondary and lesser instar preferences predators and parameter values. Application of t model shows there are age distributions chara teristic of constant growth rate and there are oth distinct age distributions characteristic of crashi populations or of particular portions of oscillati populations. (Harris-Wisconsin)
W77-03390

SILT REMOVAL FROM A LAKE BOTTOM.
Lake Herman Development Association, Inc Madison, S. Dak.
For primary bibliographic entry see Field 5C
W77-03392

TROPHICATION AND RESTORATION OF KES RECEIVING NUTRIENTS FROM DIF-SE SOURCES ONLY,
r primary bibliographic entry see Field 5C.
7-03536

YTOPLANKTON RESPONSE TO OSPHORUS AND SILICA ENRICHMENTS IN KE MICHIGAN,
chigan Univ., Ann Arbor. Great Lakes search Div.
r primary bibliographic entry see Field 5C.
7-03537

MNOLOGICAL CHARACTERISTICS OF RIP MINE PONDS IN NORTHWESTERN LORADO, U.S.A.,
r primary bibliographic entry see Field 5C.
7-03538

VIRONMENTAL STATUS OF THE LAKE CHIGAN REGION. VOL. 17. INLAND HES OF THE LAKE MICHIGAN DRAINAGE SIN,
gonne National Lab., Ill.
r primary bibliographic entry see Field 6G.
7-03566

ECIPITATION ON THE ARAL SEA SUR-CE, (IN RUSSIAN),
r primary bibliographic entry see Field 2B.
7-03592

E PEOPLE'S LAKE,
ve Lake Superior Association, Duluth, Minn.
r primary bibliographic entry see Field 5G.
7-03594

ATER QUALITY, PLANKTON AND TROPHICATION OF BERGSVATNET, KEREN AND FISKUMVATNET, S. NORWAY, NORWEGIAN),
rsk Institutt for Vannforskning, Blindern.
r primary bibliographic entry see Field 5C.
7-03595

OWTH, MORTALITY AND PRODUCTION BRACHYSYNODONTIS BATENSODA SCES, MOCHOCIDAE) IN THE UTHEASTERN ARCHIPELAGO OF LAKE HAD, (IN FRENCH),
Benech.
horstom Ser Hydrobiol 9(2), p 91-103, 1975.

scriptors: Biomass, *Productivity, Lakes, rowth rates, *Mortality, Droughts, Fish, Fish d organisms, Zooplankton.
ntifiers: *Brachysynodontis-Batensoda, ochocidae, *Lake Chad, Pelagic fish.

he SE archipelago of Lake Chad, monthly fish-with gill nets and seines were used to study the wth, mortality and production of B. batensoda m April 1971-March 1974. Owing to the drought 1972 and 1973, the water level lowered 2.70 m; 1st semester 1973, the archipelago was cut off m the lake and 90% of its water surface dried. fore the drought the abundance of age class 70 hort b) probably inhibited the growth of the er age classes. The decrease in the catch per t effort gives a mortality estimate of cohort b , according to Allen's method, its net produc-n is 38 kg/ha per yr. The production/mean mass ratio is 0.968. From the 2nd semester 1972 wards, the reduction of living space of this plankton feeding pelagic fish led to persistent wth inhibition. A condition factor study in-ates a slight weight increase since the flood ctober 1973).--Copyright 1976, Biological Ab-acts, Inc.
7-03597

2I. Water In Plants

EFFECT OF WATER STRESS ON THE PHASIC DEVELOPMENT OF ANNUAL MEDICAGO SPECIES,
Queensland Dept. of Primary Industries, Warwick (Australia).
N. M. Clarkson, and J. S. Russell.
Australian Journal of Agricultural Research, Vol. 27, p 227-234, 1976. 2 fig, 2 tab, 16 ref.

Descriptors: *Moisture stress, *Soil water, *Soil-water-plant relationships, *Crop response, Moisture content, *Alfalfa, Stress, Moisture, Soil types, Clays, Soil chemistry, Chemical properties, Wilting, Growth stages, Field capacity, Crops.
Identifiers: *Phasic development(Alfalfa).

The extent to which water stress affects the phasic development and growth of annual medics is of considerable importance in assessing the yield and survival potential of cultivars in subtropical eastern Australia. The effects of water stress on the phasic development of six annual Medicago species were examined in a laboratory experiment where plants were grown from seed to maturity under four different watering regimes. The phasic development of the plants was examined at 2-day intervals. Stress was varied by allowing the soil to dehydrate to different degrees before rewetting, the cycles being repeated continuously. The results presented suggest that annual medics have no mechanisms for evading dry seasonal conditions by earlier flowering, but once flowering has begun phasic development is accelerated in some species by water stress. The implications of this research for the interpretation and prediction of field behavior of annual medics are that water stress can affect phasic development mainly through a delay in flowering. However, those effects appear to be small compared with those due to vernalization, photoperiod and temperature. (Jamail-Arizona)
W77-03136

A COMPARISON OF SEASONAL PRIMARY PRODUCTION OF MOJAVE DESERT SHRUBS DURING WET AND DRY YEARS,
EG and G Environmental Consultants, Denver, Colo.
S. A. Bamberg, A. T. Vollmer, G. E. Kleinkopf, and T. L. Ackerman.
The American Midland Naturalist, Vol. 95, No. 2, p 398-405, April, 1976. 2 fig, 2 tab, 18 ref.

Descriptors: *Photosynthesis, *Desert plants, *Primary productivity, *Plant growth, Carbon dioxide, Moisture stress, Moisture content, Water requirements, Energy conversion, Stress, Transpiration, Terrestrial habitats, Rainfall, Precipitation(Atmospheric), Arid climates, Ecosystems, *Shrubs.
Identifiers: *Mojave Desert shrubs.

The net primary production of Mojave Desert shrubs during two seasons is compared with contrasting moisture conditions using both a destructive harvest technique and gas exchange measurements throughout the growing season. Net primary production estimates of desert shrubs were determined by carbon dioxide exchange and harvest methods at the Nevada site. Gas exchange rates were measured on shrubs under natural field conditions using a modified Siemens null-point chamber. Production gains varied among species depending on whether the species was favored by the cool, moist spring of 1973. Lycium andersonii and Lycium pallidum, which have high photosynthetic rates and start growth in the early spring, showed the greatest increases. Larrea tridentata and Krameria parvifolia, species adapted to growing under warmer, drier conditions, exhibited the smallest changes in production. Ambrosia dumosa, which has high photosynthetic rates but responds more favorably to warmer spring temperatures than the Lycium species, had moderate production gains. Reasons for the different estimates obtained by the two methods are discussed and evaluated. (Jamail-Arizona)
W77-03138

WATER STRESS INDUCED ALTERATIONS OF THE STOMATAL RESPONSE TO DECREASES IN LEAF WATER POTENTIAL,
Texas A and M Univ., College Station. Dept. of Soil and Crop Sciences.
K. W. Brown, W. R. Jordon, and J. C. Thomas.
Physiologia Plantarum, Vol. 37, No. 1, p 1-5, 1976. 4 fig, 27 ref.

Descriptors: *Stomata, *Moisture stress, Osmotic pressure, *Moisture deficit, *Moisture tension, Leaves, Stress, Moisture, Growth chambers, Cotton, Soil water, Moisture content, Plant growth, Plant physiology, Photosynthesis.
Identifiers: *Leaf water potential, Stomatal response.

An experiment was conducted to document adjustments in stomatal response to leaf water potential of cotton resulting from preconditioning water stress and to investigate the mechanism responsible for any adjustment found. Young growth-chamber cotton plants were subjected to a series of eight periods of soil water stress, which served as a preconditioning treatment. After preconditioning, water was withheld and changes in the stomatal resistance and leaf water potential were determined and compared with similar well watered control plants. Results indicate that the stomatal response of stress-preconditioned plants adjusted significantly. The resistance -- leaf water potential relation for the adaxial surface, was unaltered by the preconditioning treatment. Adjustment of the osmotic potential of guard cells on the abaxial surface provides at least a partial explanation of this change in response. The lack of adjustment of stomatal response on the adaxial surface of the leaves was correlated with a lack of adjustment in osmotic potential of guard cells on that surface. (Jamail-Arizona)
W77-03140

CULTIVATION AND BREEDING OF OENOTHERA-PLANT: IV. EFFECT OF SOIL MOISTURE ON GROWTH AND COMPONENTS IN SEED OF O. BIENNIS, (IN JAPANESE),
Nagasaki Univ. (Japan). Faculty of Pharmaceutical Science.
N. Skokyu, I. Watanabe, J. Fujimoto, and H. Ohashi.
Syoyakugaku Zasshi 28(2), p 134-138, 1974.

Descriptors: *Soil moisture, *Plant growth, Plant physiology, Plant growth regulators, Methodology, Resistivity.
Identifiers: Breeding, Linolenic-acid, Oenothera, *Oenothera-biennis, Seed oil.

The weight method and the electric resistance method (using the watering controller) were used. Soil moisture is expressed as percentages of water capacity. Soil moisture was better controlled by the watering controller than by the weight method. Most suitable for plant growth and greatest seed yield was 60-40% soil moisture. Content and quality of seed oil were influenced little by soil moisture. When soil moisture. When soil moisture was extremely reduced the value diminished. Soil moisture of 60-40% increased oil yield and gamma-linolenic acid.--Copyright 1976, Biological Abstracts, Inc.
W77-03148

CHANGES IN THE TRANSPIRATION RATE AND LEAF WATER CONTENT IN SEVERAL VARIETIES OF CRYPTOMERIA JAPONICA SUBJECTED TO WATER STRESS, (IN JAPANESE),
Government Forest Experiment Station, Tokyo (Japan).

For primary bibliographic entry see Field 2D.
W77-03155

REPRODUCTION BY ADFLUVIAL SALMONIDS IN SPAWN CREEK, CACHE COUNTY, UTAH,
Utah State Univ., Logan. Coll. of Engineering.
D. R. Bernard.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 222, Price codes: A06 in paper copy, A01 in microfiche. Masters Thesis in Wildlife Science, 1976. 89 p, 28 tab, 9 fig, 56 ref. OWRT B-105-UTAH(2). 14-31-0001-4135.

Descriptors: *Fish reproduction, Aquatic habitats, Water temperature, *Salmonids, *Utah, *Fish migration, *Trout, Brook trout, Brown trout, Cutthroat trout, Watershed management, Growth rates, Streams.
Identifiers: *Adfluvial salmonids, *Spawn Creek(Utah), Cache County(Utah).

This study concerned the migration and production of indigenous populations of brown, brook, and cutthroat trouts in Spawn Creek, Cache County, Utah for the years 1973 and 1974. Important characteristics of Spawn Creek and its watershed were described, including the prevalent, aquatic taxa of fauna and flora. A two-way fish trap and electro-fishing gear, were used to collect data for periodic estimates of mean weight and density stratified by year classes. The estimates of density were obtained through a modified form of the two-catch removal estimator. Mathematical models to describe the time-dependent growth and density were constructed from the von Bertalanffy equation and the equation of depensatory mortality by adding trigonometric components to each. The periodic estimates from the data showed that several year classes such as the 1971 year class of cutthroat trout and the 1970 and 1971 year classes of brook trout, were numerically dominant in 1973 but not in 1974. Immigration occurred seasonally with the adult cutthroat trout migrating in the spring, and the juvenile cutthroat and brown trouts moving in the fall. Migration of brook trout was not significant. Production was greater in the growing season of 1973 than in 1974 for all species. The failure of the brook trout to produce new dominant year classes was attributed to the evacuation of beaver and the subsequent dilapidation of their ponds.
W77-03160

EVAPOTRANSPIRATION REDUCTION BY FIELD GEOMETRY EFFECTS,
Oklahoma State Univ., Stillwater. Dept. of Agronomy.
For primary bibliographic entry see Field 2D.
W77-03169

SIMULATION OF FIELD WATER UPTAKE BY PLANTS USING A SOIL WATER DEPENDENT ROOT EXTRACTION FUNCTION,
Institute for Land and Water Management Research, Wageningen (Netherlands).
For primary bibliographic entry see Field 2G.
W77-03315

A REVIEW OF CLUSTERING TECHNIQUES WITH EMPHASIS ON BENTHIC ECOLOGY,
Portland State Univ., Oreg. Urban Studies Center.
For primary bibliographic entry see Field 5A.
W77-03372

DIURNAL FLUCTUATION OF LEAF-WATER POTENTIAL OF CORN AS INFLUENCED BY SOIL MATRIC POTENTIAL AND MICROCLIMATE,
Agricultural Research Service, Florence, S. C. Coastal Plains Soil and Water Conservation Research Center.
For primary bibliographic entry see Field 3F.
W77-03394

SOIL POTASSIUM RELATIONSHIPS AS INDICATED BY SOLUTION EQUILIBRATIONS AND PLANT UPTAKE,
Ohio State Univ., Columbus. Dept. of Agronomy.
For primary bibliographic entry see Field 2G.
W77-03395

THE REGULATION OF TRANSPIRATION EXPENDITURE OF MOISTURE BY PLANTS WITH THE AID OF ANTITRANSPIRANTS, (IN RUSSIAN),
Moskovskii Lesotekhnicheskii Institut (USSR).
For primary bibliographic entry see Field 3B.
W77-03475

EXPERIMENTAL ECOLOGY OF SELECTED VERTEBRATE SPECIES,
Pittsburgh Univ., Pa.
For primary bibliographic entry see Field 6G.
W77-03564

2J. Erosion and Sedimentation

MINIMUM UNIT STREAM POWER AND FLUVIAL HYDRAULICS,
Corps of Engineers, Chicago, Ill. North Central Div.
For primary bibliographic entry see Field 8B.
W77-03080

IMPACTS OF THE DEPOSITION OF DREDGED SPOILS ON LAKE ERIE SEDIMENT QUALITY AND ASSOCIATED BIOTA,
State Univ. of New York Coll. at Buffalo. Great Lakes Lab.
For primary bibliographic entry see Field 5C.
W77-03094

BEACH PROCESSES, PERRIEN COUNTY, MICHIGAN,
Florida State Univ., Tallahassee. Dept. of Geology.
W. F. Tanner.
Journal of Great Lakes Research, Vol. 1, No. 1, p 171-178, October 1975. 3 fig, 8 ref.

Descriptors: *Lake Michigan, *Beach erosion, *Model studies, *Michigan, Lakes, Shore protection, Littoral drift, Waves(Water), Water levels, Erosion, Coasts, Model studies, Sediment transport, Lake shores.
Identifiers: Beach pads.

The level of Lake Michigan rose markedly and rapidly in the decade 1964-1974. Theoretically, a significant rise in lake level is accompanied and followed by an important increase in beach erosion; much or most of the sand eroded should be carried offshore, rather than in the littoral drift system. Computer simulation, measures of erosion rates on air photos, depletion of an artificial sand stockpile, beach pad histories, and other studies indicated that the theoretical effects have also been the actual results. The theoretical projection was confirmed. The importance of transverse transport (more or less at right angles to littoral transport) in the study area points up the fact that presently known types of coastal defense works, largely designed with littoral drift in mind, may not be effective on segments of coast where water levels are rising or have recently risen significantly. Although littoral drift in the study area has been limited, it has operated clearly in the form of 'beach pads', discrete masses of sand which move at measurable rates. Beach pads were derived from an artificial stockpile of sand, but, in this case, not from erosion of the natural dunes. Each beach pad, with its associated bar, furnishes a diagonal path along which sand is transported from the beach into deeper water under oblique wave attack. The amount of sand moved offshore in this way is not measured by considering the migration rate of the pads. (Humphreys-ISWS)
W77-03095

THE ILLINOIS COASTAL ZONE MANAGEMENT PROGRAM: FIRST YEAR WORK PRODUCT. VOLUME II. COASTAL GEOLOGICAL STUDIES.
Illinois State Geological Survey, Urbana.
For primary bibliographic entry see Field 2H.
W77-03103

PIPING IN EARTH DAMS CONSTRUCTED OF DISPERSIVE CLAY; LITERATURE REVIEW AND DESIGN OF LABORATORY TESTS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Soils and Pavements Lab.
For primary bibliographic entry see Field 8D.
W77-03112

DISTRIBUTION, COMPOSITION AND TRANSPORT OF SUSPENDED PARTICULATE MATTER IN THE GULF OF ALASKA AND SOUTHEASTERN BERING SHELF,
National Oceanic and Atmospheric Administration, Seattle, Wash. Pacific Marine Environmental Lab.
For primary bibliographic entry see Field 2L.
W77-03248

NATURE AND GENESIS OF SOME STORM WASHOVER DEPOSITS,
Coastal Engineering Research Center, Fort Belvoir, Va.
For primary bibliographic entry see Field 2L.
W77-03293

SCOUR AROUND BRIDGE PIERS,
West Virginia Univ., Morgantown. Engineering Experiment Station.
For primary bibliographic entry see Field 8B.
W77-03294

COMPUTER PROGRAMS FOR SEDIMENT TRANSPORT, DOCUMENTATION AND LISTING,
Colorado State Univ., Fort Collins. Engineering Research Center.
K. Mahmood, and V. M. Ponce.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-244 838. Price codes: A06 in paper copy, A01 in microfiche. Report CER75-76 KM-VMP 2, August 1975. 96 p, 8 ref, append. NSF ENG72-00274-A01, OIP75-15976.

Descriptors: *Computer programs, *Sediment transport, *Sedimentation, Suspended solids, Bed load, Beds, River beds, Erosion, Publications, Sediments, Data processing, Computer models, Digital computers, Documentation.

Five FORTRAN programs for the computation of sediment transport were presented in the form of a reference manual with documentation and listing included. The programs deal with the following methods: (1) Einstein Bed-Load Function, (2) Mahmood's Bed Material Transport Function, (3) Colby's Bed Material Load Method, (4) Meyer-Peter and Muller Bed-Load Equation, and (5) Modified Einstein Procedure. The programs are written in FORTRAN IV language and have been extensively tested on the CDC 6400 Computer at the Colorado State University using Scope 3.3. (Sims-ISWS)
W77-03298

MENT MASS BALANCE OF A LARGE
ARY, LONG ISLAND SOUND,
Univ., New Haven, Conn. Dept. of Geology
eophysics.
rimary bibliographic entry see Field 2L.
03323

ATIONSHIPS BETWEEN SAND INPUT
M RIVERS AND THE COMPOSITION OF
OS FROM THE BEACHES OF SOUTHERN
FORNIA,
ersity of Southern California, Los Angeles.
of Geological Sciences.
rimary bibliographic entry see Field 2L.
03324

NE-CAMERA TECHNIQUE FOR PROCESS
SUREMENT ON A RIDGE AND RUNNEL
CH,
ing Univ. (England). Dept. of Geology; and
ing Univ. (England). Sedimentology
arch Lab.
rimary bibliographic entry see Field 2L.
03325

GE SAND WAVES ON THE ATLANTIC
ER CONTINENTAL SHELF AROUND
MINGTON CANYON, OFF EASTERN
ED STATES,
ogical Survey, Boston, Mass.
rimary bibliographic entry see Field 2L.
03332

SUREMENT OF 'TURBIDITY' AND RE-
ED CHARACTERISTICS OF NATURAL
ERS,
ogical Survey, Reston, Va. Water Resources

rimary bibliographic entry see Field 7B.
03339

Chemical Processes

COMPOSITION OF RAINWATER AT
SITES NEAR TOWNSVILLE, QLD.
TRALIA),
monwealth Scientific and Industrial Research
nization, Townsville (Australia). Div. of

Probert.
ralian Journal of Soil Research, Vol. 14, No.
97-402, October 1976. 1 fig, 3 tab, 12 ref.

riptors: *Rainwater, *Water chemistry,
tralia, Chemical properties, Ions, Sodium,
rides, Calcium, Sulfur, Seasonal, Pollutant
ification.
ifiers: *Townsville(Qld).

water samples collected over two years at two
near Townsville have been analysed. The
ts differ from those obtained at other sites in
ralia in that the deposition of sodium and
ide was relatively low, the sodium to chloride
was below that of seawater, and the samples
enriched with sulfur and calcium in relation
awater. A feature of the rainwater composi-
is the marked seasonal variation in the con-
ation of all ions, much higher values being
ned in out-of-season rains than during the wet
n, but the ionic ratios were not sensitive to
easonal distribution of rainfall. A common
e for the 'excess' ions present in the rain-
could not be established. (CSIRO)
03279

ECTS OF THE CHEMICAL VARIABILITY
SOME TASMANIAN INLAND WATERS
TRALIA),
ania Univ., Hobart (Australia). Dept. of
ny.
Buckney.

Australian Journal of Marine and Freshwater Research, Vol. 27, No. 3, p. 351-358, September 1976. 5 fig, 2 tab, 14 ref.

Descriptors: *Variability, *Water chemistry, *Surface waters, *Australia, Lakes, Ions, Salinity, Climates, Surveys, Geology, Lake morphology, Pollutant identification.
Identifiers: *Tasmania.

Inland waters may change substantially in chemical content in a short time; variability in total concentration and in the relative proportions of the major dissolved constituents are probably the main factors distinguishing inland waters as chemical systems from oceanic waters. There is, however, little information on the extent to which a water may be expected to vary chemically. A study of 25 Tasmanian waters has described their chemical variability and assessed the main factors contributing to it. The standard deviations of total concentration and ionic concentrations was found to be proportional to a power of the mean concentration. Stoichiometric variability is low in saline waters and can be high in fresh waters. Climate is recognised as being of primary importance as a factor in variability, though morphometric characters exert an influence. Geological conditions are an important factor in determining stoichiometric variability. (CSIRO)
W77-03283

CHEMISTRY OF SALT LAKES AND OTHER WATERS IN THE SUB-HUMID REGIONS OF TASMANIA (AUSTRALIA),
Tasmania Univ., Hobart (Australia). Dept. of Botany.
For primary bibliographic entry see Field 2H.
W77-03284

STABILITY OF IONIC PROPORTIONS IN FIVE SALT LAKES IN VICTORIA, AUSTRALIA,
Adelaide Univ. (Australia). Dept. of Zoology.
For primary bibliographic entry see Field 2H.
W77-03285

CHEMICAL COMPOSITION OF SOME INLAND SURFACE WATERS IN SOUTH, WESTERN, AND NORTHERN AUSTRALIA,
Adelaide Univ. (Australia). Dept. of Zoology.
W. D. Williams, and R. T. Buckney.
Australian Journal of Marine and Freshwater Research, Vol. 27, No. 3, p. 379-397, September 1976. 3 fig, 6 tab, 38 ref.

Descriptors: *Surface waters, *Australia, *Saline lakes, *Ions, Salinity, Sodium, Chlorides, Water chemistry, Lakes, Streams, Standing waters.

The results of previous investigations, mainly in Eastern Australia, have established that a major feature of Australian inland waters is high salinity with a predominance of sodium and chloride ions in saline waters. Less evidence has been available on the chemistry of waters in South Australia and Western Australia. Numerous analyses of waters in these areas are presented and discussed. In three areas of South Australia, salinities were high, with sodium and chloride ions dominant; in the southwest of Western Australia, the pattern in both rivers and standing waters was similar, though in this region there were freshwater lakes and streams of low salinities. In running and standing waters of Northern Australia, by contrast, salinities were low and there was no consistent pattern of ionic dominance. (CSIRO)
W77-03286

MAPS SHOWING GROUND-WATER CONDITIONS IN THE SAN SIMON AREA, COCHISE AND GRAHAM COUNTIES, ARIZONA, AND IN HIDALGO COUNTY, NEW MEXICO--1975,
Geological Survey, Tucson, Ariz. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-03327

MAPS SHOWING GROUND-WATER CONDITIONS IN THE SAN BERNARDINO VALLEY AREA COCHISE COUNTY, ARIZONA--1975,
Geological Survey, Tucson, Ariz. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-03328

GROUND-WATER QUALITY DATA FOR GEORGIA,
Geological Survey, Doraville, Ga. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-03333

BURIED AQUIFERS IN THE BROOTEN-BELGRADE AND LAKE EMILY AREAS, WEST-CENTRAL MINNESOTA--FACTORS RELATED TO DEVELOPING WATER FOR IRRIGATION,
Geological Survey, St. Paul, Minn. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-03335

APPRAISAL OF WATER RESOURCES IN THE HACKENSACK RIVER BASIN, NEW JERSEY,
Geological Survey, Trenton, N. J. Water Resources Div.
For primary bibliographic entry see Field 2F.
W77-03336

CHEMICAL COMPOSITION DATA AND CALCULATED AQUIFER TEMPERATURE FOR SELECTED WELLS AND SPRINGS OF HONEY LAKE VALLEY, CALIFORNIA.
Geological Survey, Menlo Park, Calif. Water Resources Div.
R. H. Mariner, T. S. Presser, and W. C. Evans.
Open-file report 76-783, October 1976. 10 p, 1 fig, 4 tab, 10 ref.

Descriptors: *Chemical analysis, *Hot springs, *Groundwater, *Water wells, Gases, Water temperature, Aquifer characteristics, Thermal water, Geochemistry, Water chemistry, Data collections, *California.
Identifiers: *Honey Lake Valley(Calif).

Major element, minor element, and gas composition data are tabulated for 15 springs and wells in Honey Lake Valley, California. Wendel and Amedee hot springs issue Na-S04-C1 waters at boiling or near boiling temperatures; the remaining springs and wells issue Na-HC03 waters at temperatures ranging from 14 to 33 deg C. Gases escaping from the hot springs are principally nitrogen with minor amounts of methane. The geothermometers calculated from the chemical data are also tabulated for each spring. (Woodard-USGS)
W77-03342

CHEMICAL AND BACTERIOLOGICAL QUALITY OF WATER AT SELECTED SITES IN THE SAN ANTONIO AREA, TEXAS, AUGUST 1968 - JANUARY 1975,
Geological Survey, Austin, Tex. Water Resources Div.
For primary bibliographic entry see Field 5A.
W77-03343

SUMMARY OF GEOLOGY AND GROUND-WATER RESOURCES OF PASSAIC COUNTY, NEW JERSEY,
Geological Survey, Trenton, N.J. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-03345

GROUND-WATER RESOURCES OF GREELEY AND WICHITA COUNTIES, WESTERN KANSAS,
Geological Survey, Lawrence, Kans. Water Resources Div.; and Geological Survey, Lawrence, Kans.
For primary bibliographic entry see Field 4B.
W77-03347

SELECTED DATA ON WATER WELLS, GEOTHERMAL WELLS, AND OIL TESTS IN IMPERIAL VALLEY, CALIFORNIA,
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-03348

EXPERIMENTAL STUDIES ON MATERIAL TRANSACTIONS BETWEEN MUD AND WATER OF THE GNADENSEE,
For primary bibliographic entry see Field 5C.
W77-03370

EFFECT OF ADDED SALTS ON NITROGEN RELEASED AND NITRATE LEVELS IN FOREST SOILS OF THE WASHINGTON COASTAL AREA,
Western Washington Research and Extension Center, Puyallup.
For primary bibliographic entry see Field 2G.
W77-03396

A MODEL FOR THE CONTROL OF DISSOLVED MANGANESE IN THE INTERSTITIAL WATERS OF CHESAPEAKE BAY,
Johns Hopkins Univ., Baltimore, Md. Dept. of Earth and Planetary Sciences.
For primary bibliographic entry see Field 5B.
W77-03556

2L. Estuaries

QUADRATIC FINITE ELEMENTS IN SHALLOW WATER PROBLEMS,
Universidade Federal do Rio Grande do Sul, Porto Alegre (Brazil).
For primary bibliographic entry see Field 8B.
W77-03083

CURRENT STRUCTURE AND MIXING IN THE SHELF/SLOPE WATER FRONT SOUTH OF NEW ENGLAND,
Woods Hole Oceanographic Institution, Mass.
A. D. Voorhis, D. C. Webb, and R. C. Millard.
Journal of Geophysical Research, Vol. 81, No. 21, p 3695-3708, July 20, 1976. 16 fig, 29 ref. ONR N00014-66-C-0241, N00014-74-C-0262.

Descriptors: *Currents(Water), *Mixing, *Continental shelf, *Atlantic Ocean, Surveys, On-site investigations, On-site data collections, Buoys, Floats, Salinity, Conductivity, Temperature, Water temperature, Ocean currents, Instrumentation, Heat transfer, Oceanography.
Identifiers: Neutrally buoyant floats.

Horizontal and vertical currents in the front along the edge of the continental shelf south of New England during the late spring were measured by tracking special, neutrally buoyant floats which tagged different water masses. The mean current (10-20 cm/s) was westward along the shelf and was confined completely to the overlying shelf water with a geostrophic transport of about 0.7 sverdrups between the 80- and 300-m isobaths. No mean cross-shelf or vertical currents could be reliably measured. Higher frequency currents were detected and were described in this paper. Numerous conductivity-temperature-depth lowerings were made over the drifting floats to examine the interleaving process and possible mixing between shelf water and slope water. It was found that the layers are thinned by vertical shear, and they gain and lose both heat and salt on a time scale of 1-3 days. This, plus the rich microstructure, suggests the existence of vertical turbulent exchange between layers having a turbulent diffusivity of the order of 5 sq cm s. Estimates of net annual heat and salt input to the shelf were made, and they appear to be significant in determining the heat and salt budget of the shelf water mass. (Sims-ISWS)
W77-03087

EDDY KINETIC ENERGY IN THE DEEP WESTERN NORTH ATLANTIC,
Woods Hole Oceanographic Institution, Mass.
W. J. Schmitz, Jr.
Journal of Geophysical Research, Vol. 81, No. 27, p 4981-4982, September 20, 1976. 1 fig, 5 ref. ONR N00014-66-C0241, ONR N00014-74-C0262.

Descriptors: *Eddies, *Energy, *Atlantic Ocean, Circulation, Water circulation, Ocean circulation, Current meters, Oceans, On-site investigations, Oceanography.
Identifiers: *Eddy energy.

Long-term moored current meter data were used to demonstrate the existence of 2 orders of magnitude of variation for the kinetic energy per unit mass associated with low-frequency fluctuations in the western North Atlantic Ocean at depths near 4000 m. The maximum was observed to be located near the Gulf Stream and the minimum outside of a recently hypothesized deep mean gyre. (Sims-ISWS)
W77-03088

THE BOTTOM BOUNDARY LAYER OF THE DEEP OCEAN,
Woods Hole Oceanographic Institution, Mass.
L. Armi, and R. C. Millard, Jr.
Journal of Geophysical Research, Vol. 81, No. 27, p 4983-4990, September 20, 1976. 4 fig, 30 ref. ONR N00014-66-C0241, NSF GX-29054.

Descriptors: *Boundary layers, *Atlantic Ocean, *Salinity, *Temperature, Water temperature, On-site investigations, Mixing, Water circulation, Ocean circulation, Currents(Water), Current meters, Turbulence, Velocity, Oceanography.
Identifiers: *Bottom boundary layer, *Hatteras Abyssal Plain, Profiles.

Some aspects of the bottom boundary layer of the deep ocean were exhibited in profiles of salinity and temperature made with a Woods Hole Oceanographic Institution/Brown CTD microprofiler. Profiles from the center of the Hatteras Abyssal Plain have a signature that is characteristic of mixing a uniformly stratified region. Over rough or sloping topography to the east and west of the abyssal plain, the profiles have more complicated structure. All profiles show a well-mixed layer above the bottom; the penetration height of the layer varies from about 10 to 100 m and is correlated with the one-day mean velocity, inferred from current meters located above the bottom boundary layer. Over the Hatteras Abyssal Plain, the mixed layer extends above the bottom about 6 times the turbulent Ekman layer height. Over rough and sloping topography, the penetration height is between the Ekman layer height and the height observed on the flat abyssal plain. (Sims-ISWS)
W77-03089

HIGH-WAVE CONDITIONS OBSERVED OVER THE NORTH ATLANTIC IN SEPTEMBER 1961,
Chicago Bridge and Iron Co., Plainfield, Ill. Marine Research and Development.
S. K. Chakrabarti.
Journal of Geophysical Research, Vol. 81, No. 27, p 4991-4994, September 20, 1976. 4 fig, 11 ref.

Descriptors: *Waves(Water), *Ocean waves, *Atlantic Ocean, Storms, Winds, Data processing, Analytical techniques, Energy, Oceans, Ships, Oceanography.
Identifiers: *Spectral analysis, Wave spectra, Wave energy, High-wave conditions.

The Ocean Weather Ship 'Weather Reporter,' underway from the United Kingdom to assume her position at station J (near 53 deg N, 18 deg W) on the North Atlantic, encountered heavy seas over a 4-day period from September 12-15, 1961. The ship measured the sea state during this period with a shipborne wave recorder at 3-hour intervals. The wave energy spectra were computed from these records and were presented in this paper. The upper and lower confidence limits in the estimation of these energy spectra were discussed. Such statistical quantities as the significant wave height and the average period were presented. (Sims-ISWS)
W77-03090

TIME-DEPTH VARIATIONS IN TIDAL FLUX OF SUSPENDED MATTER IN THE SAINT LAWRENCE ESTUARY,
McGill Univ., Montreal (Quebec). Marine Sciences Centre.
B. d'Anglejan, and R. G. Ingram.
Estuarine and Coastal Marine Science, Vol 4, No 4, p 401-416, July 1976. 8 fig, 15 ref.

Descriptors: *Estuaries, *St Lawrence River, *Suspended solids, *Tidal effects, *Canada, Suspended load, Sediments, Sedimentation, Turbidity, Tides, Currents(Water), Water circulation, Settling velocity, Stratification.
Identifiers: *Total suspended matter, *Advection, *Resuspension, Tidal cycles.

An investigation of the factors controlling the variability of suspended matter concentration at different sites in the St. Lawrence River estuary indicated that advection is much more important than local resuspension over the semi-diurnal tidal cycle. This finding is in contrast to that observed in shallower estuaries. All stations exhibit mid-depth maxima in suspended matter concentration. The occurrence of these maxima corresponds approximately to the end of the ebb flow. Variations from this pattern are attributable to large cross-channel flow. Calculated values of suspended matter flux were used to explain the time and depth variations of suspended matter concentrations. (Bender-ISWS)
W77-03091

SURF-ZONE WATER QUALITY IN LIVERPOOL BAY,
Lancaster Univ., Bailrigg (England). Lancashire and Western Sea Fisheries Joint Committee.
For primary bibliographic entry see Field 5B.
W77-03092

RAINFALL IN THE SEYCHELLES 1941 TO 1970,
For primary bibliographic entry see Field 2B.
W77-03096

LITTER AND OIL ON THE SHORES OF UTSIRA, ROGALAND COUNTY, DURING AUTUMN 1974, (IN DANISH),
For primary bibliographic entry see Field 5B.
W77-03125

PLANKTON OF COASTAL LAGOONS: X. TRANSPORT IN THREE ESTUARIES OF THE NORTHWEST OF MEXICO (NOVEMBER, 1973) (IN SPANISH),
Universidad Nacional Autonoma de Mexico, Mexico City. Instituto de Biologia.
S. Gomez-Aguirre, and H. Santoyo.
Rev Latinoam Microbiol 17(3), p 175-183, 1975.

scriptors: *Phytoplankton, Salinity, Tempera-
e, Estuaries, *Lagoons, *Mexico, Tides,
oplankton, Water temperature.
ntifiers: Coastal lagoons.

e seaestuary interaction was examined through
dies of the transport of plankton in 3 neighbor-
tropical estuaries. Continuous observations
d sampling were carried out in the entrances of
lagoons throughout complete tidal cycles.
linity was proportional to the flux but water
nperature exhibited a reversed pattern. The
ount of phytoplankton was low when the tide
s high and concentrations of zooplankton were
h. Information on the qualitative and quantita-
e variation of plankton are presented for each
uary.--Copyright 1976, Biological Abstracts,
c.
77-03145

**ALIBRATION OF A THERMAL EN-
CHMENT MODEL FOR SHALLOW, BAR-
CADED ESTUARIES,**
niversity of South Florida, St. Petersburg. Dept.
Marine Science.
r primary bibliographic entry see Field 5B.
77-03171

**OXICITY OF NO. 2 FUEL OIL TO COON
TRIPE SHRIMP,**
ttelle Pacific Northwest Labs., Sequim, Wash.
arine Research Labs.
r primary bibliographic entry see Field 5C.
77-03186

**FFECTS OF OIL POLLUTION ON BREEDING
REY SEALS,**
'est Wales Naturalist Trust, Haverfordwest
ngland).
r primary bibliographic entry see Field 5C.
77-03187

**MMEDIATE INDUSTRIAL EFFECTS ON SEDI-
ENT MERCURY CONCENTRATIONS IN A
LEAN COASTAL ENVIRONMENT,**
lorida State Univ., Tallhassee. Dept. of Oceanog-
phy.
or primary bibliographic entry see Field 5B.
77-03188

**ELAGIC TAR IN THE NORWEGIAN
OASTAL CURRENT,**
nstitute of Marine Research, Bergen (Norway).
or primary bibliographic entry see Field 5B.
77-03190

**ISTRIBUTION AND SOURCE OF TAR ON
HE PACIFIC OCEAN,**
epartment of the Environment, Victoria (British
olumbia). Ocean Chemistry Div.
or primary bibliographic entry see Field 5B.
77-03191

**FFECTS OF OIL ON BEACHES IN WEST
ORK, IRELAND,**
niversity Coll., Cork (Ireland). Dept. of Botany
or primary bibliographic entry see Field 5C.
77-03192

**NFLUENCE OF ILLUMINATION ON
HYTOTOXICITY OF CRUDE OIL,**
Museum National d' Histoire Naturelle, Paris
France). Laboratoire de Physiologie Generale et
Comparee.
or primary bibliographic entry see Field 5C.
77-03193

**HE EFFECT OF OIL POLLUTION IN BANTRY
AY,**
niversity Coll., Cork (Ireland). Dept. of Botany.
For primary bibliographic entry see Field 5C.
W77-03194

OLYMPIC ALLIANCE OIL SPILLAGE,
Oil Pollution South East Kent, Dover (England).
For primary bibliographic entry see Field 5C.
W77-03195

**TOXICITY OF CRUDE OILS AND A DISPER-
SANT TO THE STONY CORAL MADRACIS
MIRABILIS,**
Caraibisch Marien-Biologisch Instituut, Curacao
(Netherlands, Antilles).
For primary bibliographic entry see Field 5C.
W77-03196

**DESTRUCTIVE GRAZING OF KELP BY SEA
URCHINS IN EASTERN CANADA,**
Dalhousie Univ., Halifax (Nova Scotia). Dept. of
Biology.
For primary bibliographic entry see Field 5C.
W77-03199

**PHYTOPLANKTON ECOLOGY IN VAL-
PARAISO BAY: III. PHYTOPLANKTON FROM
1972-73, (IN SPANISH),**
Chile Univ., Valparaiso. Departamento de
Oceanologia.
For primary bibliographic entry see Field 5C.
W77-03200

**CURRENT MEASUREMENTS IN THE BEAU-
FORT SEA,**
Washington Univ., Seattle. Dept. of Oceanog-
raphy.
K. Aagaard, and D. Haugen.
In: Environmental Assessment of the Alaskan
Continental Shelf. Principal Investigators' Reports
for the year Ending March 1976, Vol 11. Physical
Oceanography and Meteorology, p 11-21, April
1976. 2 fig. 03-5-033-67.

Descriptors: *Alaska, *Ocean currents, *Ocean
circulation, *Circulation, *Oil spills, *Oil pollu-
tion, *Water pollution, *Resources development,
*Baseline studies, *Environmental effects, Time
series analysis, Ice cover, Arctic Ocean, Disper-
sion.
Identifiers: *Outer Continental Shelf, Oil explora-
tion, Oil development, Petroleum resources, Cur-
rent measurements, Beaufort Sea.

The general objective of this research is to provide
long-term Eulerian time series of currents at
selected locations on the outer shelf and slope of
the Beaufort Sea, so as to describe and understand
the circulation and dynamics of the outer shelf and
slope. The time series must be long enough to
define the important temporal scales of motion.
The area is ice-covered throughout the year, so
that the specific objective must be to recover the
current measurements from anchored arrays
despite the presence of ice. Long-term direct cur-
rent measurements are necessary to describe and
understand the circulation on the shelf and the
exchange between the shelf and the deep Arctic
Ocean. This circulation and exchange are physical
mechanisms which transport and disperse pollu-
tants and substances of biological and geological
importance. The water motion also influences the
ice distribution. (Sinha-OEIS)
W77-03228

**EFFECTS OF SEASONABILITY AND VARIA-
BILITY OF STREAMFLOW ON NEARSHORE
COASTAL AREAS,**
Alaska Univ., College. Inst. of Water Resources.
For primary bibliographic entry see Field 5C.
W77-03229

**NUMERICAL STUDIES OF ALASKAN RE-
GION,**
National Oceanic and Atmospheric Administra-
tion, Seattle, Wash. Pacific Marine Environmental
Lab.
For primary bibliographic entry see Field 5B.
W77-03231

**STD MAPPINGS OF THE BEAUFORT SEA
SHELF,**
Washington Univ., Seattle. Dept. of Oceanog-
raphy.
K. Aagaard.
In: Environmental Assessment of the Alaskan
Continental Shelf. Principal Investigators' Reports
for the Year Ending March 1976, Vol 11. Physical
Oceanography and Meteorology, p 249-266, April
1976. 7 fig, 2 tab. 03-5-022-67.

Descriptors: *Alaska, *Arctic Ocean, *Ocean cir-
culation, *Ocean currents, *Resources develop-
ment, *Baseline studies, *Environmental effects,
*Water pollution, *Mapping, Seasonal, Advec-
tion, Circulation.
Identifiers: *Outer Continental Shelf, *Petroleum
resources, Oil exploration, Oil development,
Beaufort Sea, Canadian Basin, Pycnocline.

Through a series of CTD sections across the Beau-
fort Sea shelf the seasonal hydrographic sequence
was traced through the fall and winter. Several
features all combine to strongly suggest that
beginning in the fall, the north Alaskan shelf is in
fact feeding water into the pycnocline region of
the Arctic Ocean and contributing to the tempera-
ture structure which is characteristic of the lower
Arctic Water of the entire Canadian Basin.
Oceanographically, the Beaufort shelf is much like
the deep Canadian Basin, however, it appears that
there is a regard in which the Beaufort shelf is of
distinct and considerable oceanographic sig-
nificance, viz. that it very likely constitutes a
source of subsurface waters for the Canadian
Basin. Should this be the case, it can possibly
spread a variety of substances from the shelf into
the Arctic Ocean pycnocline. In other words,
spreading from the shelf is not necessarily con-
fined to the surface layers. (Sinha-OIIS)
W77-03233

**PHYSICAL OCEANOGRAPHY OF THE GULF
OF ALASKA,**
National Marine Fisheries Service, Seattle, Wash.
Northwest Fisheries Center.
For primary bibliographic entry see Field 5B.
W77-03241

**NEAR-SHORE ATMOSPHERIC MODIFICA-
TION,**
National Oceanic and Atmospheric Administra-
tion, Seattle, Wash. Pacific Marine Environmental
Lab.
For primary bibliographic entry see Field 5B.
W77-03242

**A SEISMOTECTONIC STUDY OF SEISMIC
AND VOLCANIC HAZARDS IN THE PRIBILOF
ISLANDS - EASTERN ALEUTIAN ISLANDS RE-
GION OF THE BERING SEA,**
Lamont-Doherty Geological Observatory,
Palisades, N. Y.
J. N. Davies, L. House, K. H. Jacob, R. Bilham,
and V. F. Cormier.
In: Environmental Assessment of the Alaskan
Continental Shelf. Principal Investigators' Reports
for the Year Ending March 1976, Vol 12. Geology,
p 1-86, April 1976. 21 fig, 5 tab, 17 ref, append. 03-
5-022-70 and ERDA (11-1)3134.

Descriptors: *Alaska, *Seismic properties,
*Hazards, *Earthquakes, *Baselne studies,
*Resources development, *Environmental ef-
fects, *Seismic studies, *Cold regions, Volcanoes,
Geophysics, Organic compounds.

Identifiers: *Outer Continental Shelf, Oil exploration, Oil development, *Prifilof Islands, Bering Sea.

This report presents: (1) historic seismicity maps of the Shumagin seismic gap vicinity which show the relatively low level of seismic activity in the gap, a possible offset in the Benioff zone, and a few events associated with the Bering shelf continental margin south of the Pribilof Islands; (2) a seismicity map and hypocenter cross-sections based on data from the local Shumagin Islands seismic network which show a very well developed Benioff zone beneath the Shumagin Islands; (3) studies of the focal mechanisms of April 6, 1974 Shumagin Islands earthquake and the February 2, 1975 Near Islands earthquakes which respectively show thrust faulting perpendicular to the arc and right-lateral strike-slip faulting oblique to the arc along the slip direction inferred from the relative motion of the plates; (4) the first strong motion accelerograph data from the eastern Aleutians, which show accelrations consistent with those observed for earthquakes in California; (5) this year's geodetic leveling results which when compared with those from 1972 indicate that regional tilting due to tectonic strain accumulation, if it is occuring, is less than 1.9 microradians per year; and (6) seismic observations of two Strombolian eruptive cycles of Pavlof Volcano which reveal monochromatic wave trains which are identical one to the next suggesting a common source region and a harmonic source function or very efficient filtering of body waves by the pyroclastic layers of the volcano. (Sinha-OEIS)
W77-03243

COASTAL MORPHOLOGY AND SEDIMENTATION, GULF COAST OF ALASKA (GLACIAL SEDIMENTATION),
Rhode Island Univ., Kingston, Dept. of Geology.
For primary bibliographic entry see Field 5B.
W77-03244

COASTAL DYNAMICS AND SEDIMENT TRANSPORTATION, NORTHEAST GULF OF ALASKA,
South Carolina Univ., Columbia. Dept. of Geology.
D. Nummedal, and M. F. Stephen.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 12. Geology, p 214-373, April 1976. 53 fig, 6 tab, 16 ref. Also as South Carolina University Technical Report No. 9-CRD. 03-5-022-82.

Descriptors: *Alaska, *Sediment transport, *Bathymetry, *Environmental effects, *Cold regions, *Weather data, Morphology, Ocean currents, Organic compounds.
Identifiers: *Outer Continental Shelf, Oil exploration, Oil development, *Wave climates, *Wave refraction, *Wave energy, Coastal dynamics, Longshore currents, *Gulf of Alaska.

Analysis of the climatology and physical oceanography of the northeast Gulf of Alaska provides a predictive model for wave height and longshore sediment transportation along the coastline between Yakutat and Cape Suckling. The relationships between the offshore wave climate, the bathymetrically controlled patterns of refraction and the resulting shoreline variability in physical processes have been emphasized. Field observations of coastal morphology, sediment dispersal trends and breaker parameter variability were made in July and August of 1975. Despite the absence of many major storm episodes during the field season, the observed processes correlate well with the sediment distribution in all environments except on high-level storm berms and washover terraces at the east Malaspina Foreland where occasional storms induce a sediment transport direction opposite to that of the dominant conditions. The wave climate model and field observations demonstrate a general westward transport of sediment on the exposed beaches of the northeast Gulf of Alaska. Reversals of this trend are observed on the west side of Icy Bay and Yakutat Bay where the net transport direction is towards the northeast, i.e., towards the head of the bays. As an introduction to the study area figures provide a LANDSAT-satellite view and seven high-altitude oblique air photos of the coastal zone from Cape Yakataga to Yakutat Bay. (Sinha-OEIS)
W77-03245

THE ENVIRONMENTAL GEOLOGY AND GEOMORPHOLOGY OF THE GULF OF ALASKA COASTAL PLAIN,
Alaska Univ., College. Dept. of Geology.
P. J. Cannon.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 12. Geology, p 373-390, April 1976. 1 fig, 1 tab, 4 ref. 03-5-022-56.

Descriptors: *Alaska, *Geomorphology, *Coastal plains, *Water pollution, *Hazards, *Baseline studies, *Resources development, *Environmental effects, *Cold regions, Radar, Earthquakes, Mapping, Organic compounds.
Identifiers: *Outer Continental Shelf, Oil exploration, Oil development, *Gulf of Alaska, Radar imagery, *Environmental geology.

The purpose of the study was to produce information which can be used in an environmental assessment of the coastal plain section of the Gulf of Alaska, in relation to possible oil and gas development and to evaluate radar imagery as a major information source for environmental geological mapping. It was found that radar imagery is an adequate tool to use in the environmental evaluations of diverse types of coasts. X-band, real aperture radar imagery of the Gulf of Alaska coastal plain is adequate both as a mapping base and as a source of important environmental geologic data. The radar imagery of the Gulf of Alaska coastal plain indicates that severe environmental geologic hazards, such as earthquakes, surface movements along active faults, and outburst floods, have occurred recently and will continue to occur with a relatively high frequency. Natural processes are modifying parts of the coastal plain at a relatively rapid rate. (Sinha-OEIS)
W77-03246

DELINEATION AND ENGINEERING CHARACTERISTICS OF PERMAFROST BENEATH THE BEAUFORT SEA,
Cold Regions Research and Engineering Lab., Hanover, N. H.
For primary bibliographic entry see Field 2C.
W77-03247

DISTRIBUTION, COMPOSITION AND TRANSPORT OF SUSPENDED PARTICULATE MATTER IN THE GULF OF ALASKA AND SOUTHEASTERN BERING SHELF,
National Oceanic and Atmospheric Administration, Seattle, Wash. Pacific Marine Environmental Lab.
R. A. Feely, and J. D. Cline.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 12, Geology, p 467-484, and 409-466 (pages placed in wrong order), April 1976. 30 fig, 2 tab, 30 ref.

Descriptors: *Alaska, *Sediment transport, *Resources development, *Baseline studies, *Environmental effects, *Water pollution, *Pollutants, Suspended solids, Sedimentation, Oil pollution, Organic compounds.
Identifiers: *Outer Continental Shelf, Oil exploration, Oil development, *Gulf of Alaska, *Bering Sea, Seasonal variations.

Particles suspended in seawater play a major ro
in regulating the chemical forms, distributions a
ultimate deposition of many marine pollutan
Some toxic substances in particulate form a
transported to the oceans where they are desorb
at the freshwater-seawater interface. Other su
stances (particularly petroleum hydrocarbons) a
adsorbed onto the surface of suspended particl
and are removed to the sediments as the particl
settle. The major objective of the particul
matter program in the Gulf of Alaska a
southeastern Bering Shelf is to determine t
seasonal variations in the distribution, compo
tion, and transport of suspended matter. Other o
jectives include: (1) the high frequency (hour
variability in the distribution of suspended matt
and (2) the investigation of the role of resusp
sion processes as a mechanism for redistributi
of sedimentary materials. Preliminary conclusio
indicate that surface suspended matter distri
tions of the southeastern Bering Shelf appear
follow the general pattern of circulation in Bris
Bay. Suspended material from the northern riv
is generally carried to the west and southwest
the counterclockwise currents. In the Gulf
Alaska the distribution of suspended matter at
surface appears to follow the general pattern
circulation in the Gulf of Alaska. Studies of
temporal variability of suspended matter near
bottom indicate that resuspension processes m
be occurring. (Sinha-OEIS)
W77-03248

**OFFSHORE PERMAFROST STUDIES, BEA
FORT SEA,**
Geological Survey, Menlo Park, Calif.
P. Barnes, D. Carter, D. Drake, D. Hopkins, and
A. Lachenbruch.
In: Environmental Assessment of the Alask
Continental Shelf, Principal Investigators' Repo
for the Year Ending March 1976, Vol 12. Geolo
p 485-511, April 1976. 3 fig, 54 ref.

Descriptors: *Alaska, *Permafrost, *Cold regio
*Baseline studies, *Resources developme
*Water pollution, *Environmental effe
*Hazards, Sediments, Natural resources.
Identifiers: *Outer Continental Shelf, *Offsh
drilling, Oil exploration, Oil developme
*Beaufort Sea, Seismic data, Sand and gra
resources, Engineering properties.

A knowledge of the distribution of deep ice-r
permafrost is fundamental to engineer
problems related to offshore drilling and
production and to the interpretation of seis
data for resource studies. Permafrost has a mar
influence on the engineering properties of so
and probably of marine sediments. Ice gouging
the sea floor commonly exposes semi-c
solidated sediments and creates metastable go
ridges. Thus, the engineering properties of surf
and subsurface shelf sediment need to be
sessed, so that potential hazard to offshore c
struction may be determined. Sand and gravel
essential construction materials for drill pads,
strips, roads and offshore islands. In the Prud
Bay area, materials are now obtained from
river channels and from the offshore islan
where the gravel has apparently been reconc
trated from the Gubik Formation. In the vicinity
Barrow the Gubik Formation has little gravel
this building material is in short supply. A
result, the potential for the offshore sand
gravel resources needs to be evaluated. (Sin
OEIS)
W77-03249

**MARINE ENVIRONMENTAL PROBLEMS
THE ICE COVERED BEAUFORT SEA SHE
AND COASTAL REGIONS,**
Geological Survey, Menlo Park, Calif.
P. Barnes, E. Reimnitz, and D. Drake
In: Environmental Assessment of the Alask
Continental Shelf. Principal Investigators' Repo
for the Year Ending March 1976, Vol 12. Geolo

12-590, April 1976. 10 fig, numerous tab, 14 ref. 6-6074.

scriptors: *Alaska, *Ice cover, *Cold regions, esources development, *Baseline studies, nvironmental effects, *Oil pollution, rmafrost, Coasts, Pipelines, Pollutants, Or-ic compounds.
ntifiers: *Outer Continental Shelf, Oil explora-, Oil development, Offshore drilling, Arctic ean, *Beaufort Sea.

e primary goal of the program has been to un-stand the processes that are unique to Arctic lves and their sedimentary environment, where ice plays an important role. Specific objectives e included: a definition of the character of bot-materials, including permafrost; a study of the sent sediment transport and depositional chanisms; and studies of the Holocene and istocene geologic record. The character of the ic continental shelf and coastal area, with its mafrost, faces the developer with many special blems. Any structure which is to be connected he ocean floor requires data concerning the ngth and character of the ocean floor. In addi-, the offshore drilling operation may encounter mafrost which would be substantially altered ing the process of pumping hot oil up to the sea or or along the sea floor in gathering and trans-tation pipelines. The interaction of the arctic lf with the arctic pack ice takes the form of ice ging and the formation of a large stamukhi e each winter. These factors are of utmost im-tance to the designers and operators of shore terminals and pipelines. (Sinha-OEIS)
7-03250

RFACE CURRENT OBSERVATIONS - BEAU-RT SEA, 1972,
ological Survey, Menlo Park, Calif.
Barnes, and R. Garlow.
Environmental Assessment of the Alaskan ntinental Shelf. Principal Investigators' Reports the Year Ending March 1976, Vol 12. Geology, 91-599, April 1976. 6 ref. Also as U.S.G.S. Open e Report No. 75-619.

scriptors: *Alaska, *Ocean currents, *Ocean culation, *Sediment transport, Pollutants, ter pollution, *Baseline studies, *Resources elopment, *Environmental effects, Ice, Sea , *Path of pollutants.
ntifiers: *Outer Continental Shelf, Oil explora-, Oil development, *Beaufort Sea, Surface rents, Drift cards.

liment transport via water and ice in the Beau-t Sea off northern Alaska is related to the vement of the surficial waters. As development ceeds along the north slope of alaska, a owledge of the potential drift trajectories of er, ice, sediment and pollutants will be needed. an attempt to better define the probable paths rates of transport, 4200 surface drift cards e dropped during the U.S. Coast Guard WEB-C cruise of August and September, 1972. The ults of this release are the subject of this report. cause the data presented here will be used narily by those interested in solving problems ransport, the emphasis has been placed on data sentation rather than a detailed analysis of the culation. (Sinha-OEIS)
7-03251

AVY-MINERAL TRENDS IN THE BEAU-RT SEA,
ological Survey, Menlo Park, Calif.
Luepke.
Environmental Assessment of the Alaskan ntinental Shelf. Principal Investigators' Reports the Year Ending March 1976, Vol 12. Geology, 41-676, April 1976. 6 fig, 6 tab, 45 ref. Also as S.G.S Open-file Rept 75-667.

Descriptors: *Alaska, *Resources development, *Baseline studies, *Sediment transport, Sediments, *Heavy metals, Geology, *Mineralogy, Path of pollutants.
Identifiers: *Outer Continental Shelf, *Beaufort Sea, North Slope, Pack ice, *Heavy minerals.

Sediments of the Beaufort Sea, off the North Slope of Alaska contain a great variety of heavy minerals. These include garnet, chrome spinel, augite, pigionite, diopside, hornblende, enstatite, hypersthene, epidote, clinozoisite, zoisite, apatite, tourmaline, chlorit oid, sphene, zircon, and opaque minerals. Much rarer constituents are glaucophane, lamprob lite, rutile, Kyanite, staurolite, and riebeckite. Garnet increases in abundance from east to west which corresponds to a similar increase in garnet abundance in coastal outcrops of the Gubik Formation sands. Only garnet and iron-stained aggregates appear to have source-related distribution patterns. The other heavy minerals lack distinct distributive provinces, reflecting an environment dominated by intense mixing by ice-gouging and bioturbation and a homogenous source area. Waves and currents are not strong enough to sort sediments at depths greater than 10 m except during summer storms. The source of the Beaufort Sea heavy minerals is dominated by contributions from the Alaskan North Slope deposits of Tertiary and younger age. The Colville River, largest in the region, is probably the most influential in transporting sediments, but because of wave and current-mixing of sediments on the shelf, exact contributions from each river drainage cannot be ascertained. Coastal erosion of the Gubik Formation is probably at least as important as the Colville River in supplying heavy minerals to the Beaufort Sea. (Sinha-OEIS)
W77-03254

YUKON DELTA COASTAL PROCESSES STUDY,
Wesleyan Univ., Middletown, Conn. Dept. of Earth and Environmental Sciences.
W. R. Dupre, and D. M. Hopkins.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 13. Geology, p 5-40, April 1976. 10 fig.

Descriptors: *Alaska, *Oil spills, *Oil pollution, *Offshore platforms, Water pollution, *Baseline studies, Environmental effects, *Resources development, Hazards, *Deltas, Estuaries, Pipelines, Storms, Permafrost, Organic compounds.
Identifiers: *Outer Continental Shelf, *Oil exploration, *Oil development, *Coastal processes, *Offshore drilling, Bering Sea, Yukon River, Shorefast ice, Drilling platforms, Coastal stability.

Much of the Yukon delta is underlain by the onland extension of the Nunivak Arch; this would seem to exclude most of the region for serious consideration for exploration. Nevertheless, the Quaternary faults and volcanoes which characterize the zone constitute serious geologic constraints on the selection of transportation corridors. The discontinuous permafrost and the complex hydrology of the delta further complicate the location of such corridors, as well as making it difficult to predict the effects of oil spills. The selection of shoreline sites (e.g. docking and pipeline terminals) must take into account the present coastal stability, including the possibility of erosion associated with major storm surges, even in an area of long-term progradation. In addition, the effects of shorefast ice for over half of the year must be considered. The siting of offshore facilities (e.g., drilling platforms, underwater pipelines) must take into account the extent and variability of shorefast ice, the possibility (as yet unproven) of offshore permafrost, and the possible effects of altering offshore bathymetry in changing coastal stability. In addition, the effects of possible oil spills must take into account not only the dominant northward drift of water and sediments, but also the local and seasonal variability of current patterns. (Sinha-OEIS)
W77-03255

FAULT HISTORY OF THE PRIBILOF ISLAND AND ITS RELEVANCE TO BOTTOM STABILITY IN THE ST. GEORGE BASIN,
Geological Survey, Menlo Park, Calif.
D. M. Hopkins.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 13. Geology, p 41-67, April 1976. 7 fig, 12 ref.

Descriptors: *Alaska, *Pipelines, *Hazards, *Earthquakes, *Faults(Geologic), *Oil spills, *Oil pollution, *Baseline studies, *Resources development, Environmental effects, Water pollution.
Identifiers: *Outer Continental Shelf, Oil exploration, Oil development, *Pribilof Sound, Bottom stability, *St. George Basin, Fault history.

This study evaluates frequency of faulting and volcanic eruptions on the Pribilof Islands and in nearby waters, examines rates and directions of changes in the island shorelines during the 20th Century, and investigates the nature of the soils and their susceptibility to erosion after disturbance. Volcanos have been active in the Pribilof Island area throughout the last 8 m.y., activity during the last 300,000 years has been confined to the vicinity of St. Paul Island. Eruptions recur at intervals of about 10,000 years. Faulting is also an ongoing process. Fault movements recur at rather long but still unknown intervals. Although the recurrence interval of movement on individual faults is long, the fault hazard is significant, because faults cross any possible path for a pipeline connecting production areas in the St. George Basin with terminal facilities on the Pribilof Islands. The sandy beaches and sandy soils of St. Paul Island are sensitive to human activity. Perturbations related to construction of logistic bases and pipeline and transhipment facilities are likely to result in extensive changes in the beaches and loss of surface soils by wind deflation. (Sinha-OEIS)
W77-03256

EARTHQUAKE ACTIVITY AND GROUND SHAKING IN AND ALONG THE EASTERN GULF OF ALASKA,
Geological Survey, Menlo Park, Calif. Office of Earthquake Studies.
J. C. Lahr, and R. A. Page.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 13. Geology, p 69-90, April 1976. 11 fig, 10 ref.

Descriptors: *Alaska, *Hazards, *Seismic studies, *Earthquakes, *Faults(Geologic), *Coastal structures, *Oil spills, *Oil pollution, *Baseline studies, *Resources development, Environmental effects, Water pollution, Leases, Organic compounds.
Identifiers: *Outer Continental Shelf, Oil exploration, Oil development, *Gulf of Alaska, Fault history, Offshore structures.

Work completed at this time indicates that the seismic hazard is extreme in the eastern Gulf of Alaska. Continued seismic monitoring will no doubt reveal other areas of activity and delineate other active geologic structures. It is crucial that the potential seismic hazards in the eastern Gulf of Alaska be carefully analyzed and that the results be incorporated into the plans for future petroleum development. This information should be considered in the selection of tracts for lease sales, in choosing the localities for landbased operations, and in setting minimum design specifications for both coastal and offshore structures. (Sinha-OEIS)
W77-03257

EROSION AND DEPOSITION OF SHELF SEDIMENT: EASTERN GULF OF ALASKA,
Geological Survey, Menlo Park, Calif.
B. F. Molnia, and P. R. Carlson.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 13. Geology, p 91-105, April 1976. 8 ref.

Descriptors: *Alaska, *Sedimentation, *Sediment transport, *Resources development, *Baseline studies, Environmental effects, Water pollution, *Oil pollution, Erosion, Deposition, Offshore platforms.
Identifiers: *Outer Continental Shelf, Oil exploration, Oil development, *Gulf of Alaska, Artificial structures.

The continental shelf of the eastern Gulf of Alaska is in a dynamic environment. Rivers and streams carry vast quantities of glacial silt and clay to this shelf, which is affected by strong longshore currents, frequent high energy storm waves, and occasional seismic sea waves (tsunamis). If this area is to be considered safe for petroleum production, the sediments found here must be carefully studied and all characteristics thoroughly understood. The movement of sediment is a vital consideration in any decision as to where to place artificial structures, such as those used by the petroleum industry, to ensure maximum safety. (Sinha-OEIS)
W77-03258

FAULTING AND INSTABILITY OF SHELF SEDIMENTS: EASTERN GULF OF ALASKA,
Geological Survey, Menlo Park, Calif.
P. R. Carlson, and B. F. Molnia.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 13. Geology, p 107-124, April 1976. 7 fig.

Descriptors: *Alaska, *Hazards, *Environmental effects, *Baseline studies, *Resources development, Water pollution, Sediments, Faults(Geologic), Organic compounds.
Identifiers: *Outer Continental Shelf, Oil exploration, Oil development, *Gulf of Alaska, Slumps, Submarine slides.

Faults and submarine slides or slumps are potential environmental hazards on the outer continental shelf of the northern Gulf of Alaska. Submarine slides or slumps have found in two places in the OCS region: (1) seaward of the Malaspina Glacier and Icy Bay, an area of 1,770 square kilometers, that has a slope of less than one-half degree, and (2) across the entire span of the Copper River prodelta, an area of 1,730 square kilometers, that has a slope of about one-half degree. Seismic profiles across these areas show disrupted reflectors and irregular topography commonly associated with submarine slides or slumps. Other potential slide or slum areas have been delineated in areas of thick sediment accumulation and relatively steep slopes. These areas include Kayak Trough, parts of Hinchinbrook Entrance and Sea Valley, parts of the outer shelf and upper slope between Kayak Island and Yakutat Bay and Bering Trough. (Sinha-OEIS)
W77-03259

SEISMIC AND VOLCANIC RISK STUDIES - WESTERN GULF OF ALASKA,
Alaska Univ., College. Geophysical Inst.
H. Pulpan, and J. Kienle.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 13. Geology, p 125-137, April 1976. 1 fig, 1 tab. 03-5-022-55.

Descriptors: *Alaska, *Volcanoes, *Seismic studies, *Tsunamis, *Oil pollution, *Water pollution, *Baseline studies, *Resources development, *Environmental effects, Hazards, Organic compounds.
Identifiers: *Outer Continental Shelf, Oil exploration, Oil development, *Gulf of Alaska, Offshore structures.

The purpose of the study was to assess seismic and volcanic risk in the western Gulf of Alaska, primarily from seismic data. Eight new seismic stations were installed in the study area to provide a higher resolution than previously existed. Data analysis of existing seismic data and the new seismic network is in progress. Several major eruptions occurred on Augustine Island during the report period and seismic data from before and during the eruption are being analyzed. Consequences of seismic and volcanic activity such as severe ground displacements, tsunami run-ups will put severe strains of offshore and onshore structures, erected in connection with pertroleum development. Ash falls, volcanic heat and pressure waves, mudflows and fast moving glowing clouds near active volcanoes will endanger equipment and crews. This study will provide pertinent input parameters toward deciding where to put these structures and what design criteria to use. (Sinha-OEIS)
W77-03260

OFFSHORE PERMAFROST-DRILLING, BOUNDARY CONDITIONS, PROPERTIES, PROCESSES AND MODELS,
Alaska, Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 5B.
W77-03261

BEAUFORT SEACOAST PERMAFROST STUDIES,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 2C.
W77-03262

BENTHOS-SEDIMENTARY SUBSTRATE INTERACTIONS,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 5C.
W77-03263

FAULTING AND INSTABILITY OF SHELF SEDIMENTS - WESTERN GULF OF ALASKA,
Geological Survey, Menlo Park, Calif.
M. A. Hampton, and A. H. Bouma.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 13. Geology, p 307-339, April 1976. 8 fig, 1 tab, 22 ref.

Descriptors: *Alaska, *Sediments, *Water pollution, *Baseline studies, *Resources development, *Environmental effects, *Hazards, *Oil pollution, Faults(Geologic), Pollutants.
Identifiers: *Outer Continental Shelf, Petroleum resources, Oil exploration, Oil development, *Gulf of Alaska, Kodiak Island.

Surface faulting has been identified in a zone along and offshore of the southeast coast of Kodiak Island, extending northeast to Montague Island. Scattered surface faults also exist on Albatross Bank, near the edge of the continental shelf. Movement along the surface faults could affect OCS resource activities near them. No major zones of slumping have been discovered so far, although some might exist on the sloping sides of major sea valleys where quantites of fine-grained sediment are accumulating. The major sea valleys appear to be likely dispersal routes for contaminated sediments, and some local storage of these sediments also is possible in the valleys. Attention is being directed mainly to the proposed area of federal OCS oil and natural gas lease sale no. 46. The results of this study can be used to identify areas where geologica conditions adverse to resource development exist and to determine the regional dispersal patterns and storage sites of contaminants introduced into marine sediments. (Sinha-OEIS)
W77-03264

A HISTORICAL SUMMARY OF EARTHQUAK EPICENTERS IN AND NEAR ALASKA,
National Geophysical and Solar-Terrestrial Da Center, Boulder, Colo.
For primary bibliographic entry see Field 7C.
W77-03265

A STUDY OF BEAUFORT SEA COASTAL ER SION - NORTHERN ALASKA,
R. Lewellen.
In: Environmental Assessment of the Alask Continental Shelf. Principal Investigators' Repo for the Year Ending March 1976, Vol 13. Geolog p 417-427, April 1976. 03-6-022-35126.

Descriptors: *Alaska, *Sediments, *Erosi *Deposition, *Hazards, *Baseline studi *Resources development, *Environmental fects, Water pollution, Oil pollution, Coasts. Identifiers: *Outer Continental shelf, Petrole resources, Oil exploration, Oil developme *Beaufort Sea, Coastal morphology.

The purpose of this project was to evalu present rates of change in coastal morpholo with particular emphasis on rates and patterns man-induced changes and to locate areas wh coastal morphology is likely to be changed man's activities and evaluate the effect of th changes, if any. Preliminary results suggest t the coastline is definitely eroding in permafr terrain; and in other cases permafrost is rapidly grading in areas of recent deposition. (Sin OEIS)
W77-03266

THE INTERACTION OF OIL WITH SEA ICE THE ARCTIC OCEAN,
Washington Univ., Seattle. Dept. of Ocean raphy.
For primary bibliographic entry see Field 5C.
W77-03267

DYNAMICS OF NEAR-SHORE ICE,
Cold Regions Research and Engineering La Hanover, N. H.
For primary bibliographic entry see Field 2C.
W77-03268

DYNAMICS OF NEAR-SHORE ICE (DA BUOYS),
Washington Univ., Seattle. Dept. of Atmosph Sciences.
For primary bibliographic entry see Field 2C.
W77-03269

STUDY OF CLIMATIC EFFECTS ON FAST I EXTENT AND ITS SEASONAL DECAY ALO THE BEAUFORT SEA COAST,
Colorado Univ., Boulder. Inst. of Arctic and pine Research.
For primary bibliographic entry see Field 2C.
W77-03270

MECHANICS OF ORIGIN OF PRESSU RIDGES, SHEAR RIDGES AND HUMMO FIELDS IN LANDFAST ICE,
Alaska Univ., College. Geophysical Inst.
L. H. Shapiro, and W. D. Harrison.
In: Environmental Assessment of the Alas Continental Shelf. Principal Investigators' Rep for the Year Ending March 1976, Vol 14. Ic 117-153, April 1976. 6 fig, 15 ref. 03-5-022-55.

Descriptors: *Alaska, *Arctic Ocean, *Drill *Baseline studies, *Environmental effe *Resources development, *Offshore platfo Hazards, Oil spills, Oil pollution, Water pollut Deformation.

ifiers: *Outer Continental Shelf, *Landfast Offshore structures, *Ice forces, *Pressure s, *Shear ridges, Hummock fields, Oil opment, Oil exploration.

goal of this project is to develop an unnding of the forces and mechanisms ind in the formation of pressure ridges, shear and hummock fields in the near shore zone, he environmental parameters which cause features to occur in particular areas. When results are available, it may prove possible to op procedures through which average and possible occurrences of heavily deformed various localities can be predicted. It can nably be expected that early drilling offshore he barrier islands along the Arctic coast will within the area seasonally covered by landse. Siting of drilling platforms to avoid potenlging sites where possible, or to compensate e higher forces through design changes, thus ds upon a capability to predict the severity deformation to be expected at any point. preliminary conclusions are: Forces aphing the crushing strength of sea ice may be ed during the growth of grounded pressure ; the approximate coincidence of the boundear ridge of landfast ice with the 20m depth ur may be explainable in terms of the maxforces which pack ice approaching the coast v-angle can exert against the landfast ice and the ability of the ice sheet to bend and naintain continuity should be considered in esign of structures such as gravel or ice s. (Sinha-OEIS)
)3271

PHOLOGY OF BERING NEAR SHORE CONDITIONS BY MEANS OF SATELLITE AERIAL REMOTE SENSING,
a Univ., College. OCS Coordination Office.
rimary bibliographic entry see Field 2C.
)3272

ATION OF AN ALASKAN FACILITY FOR ICATIONS OF REMOTE-SENSING DATA CS STUDIES,
a Univ., College. Geophysical Inst.
rimary bibliographic entry see Field 7B.
)3277

RE AND GENESIS OF SOME STORM IOVER DEPOSITS,
al Engineering Research Center, Fort ir, Va.
Schwartz.
ible from the National Technical Informaervice, Springfield, VA 22161 as ADA-021 Price codes: A04 in paper copy, A01 in Fiche. Technical Memorandum No. 61, nber 1975. 69 p, 32 fig, 3 tab, 47 ref, 2 ap-

ptors: *Beach erosion, *Sedimentation, ts, *Atlantic Ocean, *Lake Erie, Dunes, spits, Storms, Waves(Water), Oceans, Sands, Sediments, Beaches, Shores, Barrinds, Sedimentology.
iers: *Washover deposits, *Outer (NC), *Presque Isle(Pa), Barrier morphoitoral processes.

y formed small-scale washover deposits examined along a section of the Atlantic (Outer Banks, North Carolina) and Lake Presque Isle Peninsula, Pennsylvania) to ine their stratigraphic properties, mode of ent, and relationship to adjacent barrier morphology. Storm washover occurrence is ction of the degree of storm surge and ore-foredune relief. The shape and dimenthe resulting washover sand body is largely lled by surrounding topography. Overall l distribution, modality and skewness of nt samples from the adjacent washover, foredune, and beach show a strong similarity. Modality is related to texture subpopulation, while skewness reflects subpopulation mixing. Normal and inverse grading as well as textural coarsening in the presumed direction of washover flow are distinctive trends. Storm washover results from the deposition of sediment carried in a succession of unidirectional, discontinuous surges which flow past the berm, or foredune line, and downslope across the washover surface. Flow velocities imparted by the initial fluid surge coupled with downslope gravity effects facilitate the development of flow similar to sediment gravity flow. In some cases, added shear stress imposed on a sediment-concentrated bed layer by the overlying fluid results in the development of grain flow, a type of sediment gravity flow. Washover contributes to landward and vertical accretion of relatively coarse detritus in the barrier environment, thus serving as temporary sediment sink in an erosional (transgressive) littoral drift system. (Sims-ISWS)
W77-03293

EFFECTS OF A BREAKWATER ON NEARSHORE CURRENTS DUE TO BREAKING WAVES,
Cornell Univ., Ithaca, N.Y. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W77-03297

FLOW DYNAMICS OF THE NEUSE RIVER ESTUARY,
North Carolina State Univ., Raleigh. Dept. of Geosciences.
C. E. Knowles.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-249 748, Price codes: A08 in paper copy A01 in microfiche. Sea Grant Publication UNC-SG-75-16, August 1975. 146 p, 3 fig, 1 tab, 7 ref, 6 append. NOAA 04-3-158-40.

Descriptors: *Estuaries, *Rivers, *Water circulation, *North Carolina, Circulation, Flow, River flow, Winds, Temperature, Water temperature, Tides, Tidal effects, Tidal waters, Coasts, Currents(Water), On-site investigations, Sampling, Computer programs, Data processing.
Identifiers: *Neuse River(NC), *Pamlico Sound(NC).

A 38-day definitive study of the Neuse River circulation was undertaken from 7 August to 14 September 1973. From this study the following conclusions can be made: (1) The net circulation in the river is slow and complicated (circular flow patterns across river and return flow upstream). A rough estimate of the mean net flow for the river is 1.81 cm/sec, and the corresponding transit time for water starting near New Bern and entering Pamlico Sound is 32 days. Because of the complicated crossstream, upstream flow, waste materials could remain in a local area for a time considerably longer than that predicted by the rough transit time included above. (2) Lunar tides may be the driving mechanisms for the observed circulation at all stations upstream from Pamlico Sound. All the upstream stations have a near tidal period in the upstream, downstream current fluctuations. Only one of two stations at the mouth of the river does not have a significant semi-diurnal component in its flow. (3) The winds usually tend to enhance the river circulation. They are generally diurnal (land breeze in morning, sea breeze in afternoon) and seem to have the largest effect on flow at the station located at the river mouth, but these effects may be indirect; i.e., they may be due to Pamlico Sound circulation which is generally understood to be wind-driven. (Sims-ISWS)
W77-03300

JOINT PROBABILITY METHOD OF TIDE FREQUENCY ANALYSIS APPLIED TO APALACHICOLA BAY AND ST. GEORGE SOUND, FLORIDA,
National Weather Service, Silver Spring, Md. Office of Hydrology.
F. P. Ho, and V. A. Myers.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-251 123, Price codes: A04 in paper copy, A01 in microfiche. NOAA Technical Report NWS 18, November 1975. 49 p, 23 fig, 2 tab, 12 ref.

Descriptors: *Tides, *Storms, *Floods, *Gulf of Mexico, *Florida, Historic floods, Tidal waters, Model studies, Bays, Estuaries, Storm surge, Flood frequency, Frequency analysis, Frequency curves, Hurricanes, Coasts, Barrier islands, Winds, Wind tides, Analytical techniques.
Identifiers: *Storm tides, *Apalachicola Bay(Fla), *St. George Sound(Fla), Tide frequencies, Coastal flooding, Joint probability method.

Storm tide height frequency distributions were developed within Apalachicola Bay and St. George Sound, Florida, for the National Flood Insurance Program. This was accomplished by applying Overland's numerical bay model to a full set of climatologically representative hurricanes. Surge computations by the continental shelf SPLASH model were used as the boundary input from the Gulf of Mexico. Tide levels were shown in map form and as frequency distributions at selected points between annual frequencies of 0.10 and 0.002. The report illustrated the application of a joint probability method to assessing storm tides within a bay using a hydrodynamic model. (Sims-ISWS)
W77-03304

SALINITY INDUCED HORIZONTAL ESTUARINE CIRCULATION,
Texas A and M Univ., College Station, Dept. of Oceanography.
B. A. Elliott, and R. O. Reid.
Journal of the Waterways, Harbors and Coastal Engineering Division, American Society of Civil Engineers, Vol. 102, No. WW4, Proceedings Paper 12550, p 425-442, November 1976. 15 fig, 25 ref, 3 append. N00014-68-A-0308-0002.

Descriptors: *Salinity, *Estuaries, *Model studies, *Density, *Computer models, *Circulation, Physical properties, Density currents, Stratification, Estuarine environment, Gulfs, Oceanography, Chemical properties, Vortices, Mathematical models, Water circulation, Density stratification, Numerical analysis, Water properties.
Identifiers: *Estuarine circulation, *Salinity gradients, Finite differences, Horizontal salinity gradients, Density gradient.

A finite difference approximation to the equations of motion without the field acceleration terms and the salt conservation equation with an isotropic diffusion coefficient were used to model the circulation of a rectangular basin having the gross dimensional characteristics of a bar-built estuary. The recursion relations include the dynamic effects of horizontal salinity variations. Two cases were examined. In the first case, the basin has a constant depth; and in the second case, the bottom slope varies linearly across the basin. The resulting patterns of circulation were qualitatively analyzed using a vorticity equation. The analysis indicated that the dynamic effects of horizontal salinity gradients can be significant in controlling the circulation in localized sections of the basin. (Henley-ISWS)
W77-03312

SEASONAL VARIATION OF RESIDUAL DRIFT IN LONG ISLAND SOUND,
Connecticut Univ., Groton. Marine Sciences Inst.
D. F. Paskausky, and D. L. Murphy.
Estuarine and Coastal Marine Science, Vol. 4, No. 5, p 513-522, September 1976. 10 fig, 2 tab, 13 ref.

Descriptors: *Estuaries, *Sounds, *Drifting(Aquatic), *Onrsite investigations, Winds, Currents(Water), On-site data collections, Circulation, Seasonal, Upwelling, Water circulation, Movement, Coasts, Connecticut.
Identifiers: *Long Island Sound.

Residual drift in Long Island Sound (LIS) was analyzed based on the recovery of 346 out of 951 surface and bottom drifters released at 86 locations in 1973 and 1974. Two periods of distinctly differing drift correlated with wind and freshwater discharge variation. The summer period (June to early November 1973) was characterized by relatively weak southwest winds and low freshwater discharge. In the winter period (after early November 1973), there were strong northwest winds and relatively high freshwater discharge. An estuarine circulation (surface outflow and bottom inflow) exists in eastern LIS throughout the year. Bot..m drifter returns received in the summer period indicated that the westward flux of near bottom waters does not extend into central LIS past Mattituck Sill. During the winter season, near bottom waters move well into central LIS, and upwelling against the Connecticut coast is apparent. There was little evidence for significant near bottom exchange between western and central LIS. (Humphreys-ISWS)
W77-03322

SEDIMENT MASS BALANCE OF A LARGE ESTUARY, LONG ISLAND SOUND,
Yale Univ., New Haven, Conn. Dept. of Geology and Geophysics.
H. J. Bokuniewicz, J. Gebert, and R. B. Gordon.
Estuarine and Coastal Marine Science, Vol. 4, No. 5, p 523-536, September 1976. 8 fig, 1 tab, 29 ref, 1 plate.

Descriptors: *Estuaries, *Sounds, *Sediments, *Surveys, On-site investigations, Topography, Sounding, Measurement, Sediment distribution, Erosion, Geomorphology, Sands, Glacial drift.
Identifiers: *Long Island Sound.

Acoustic reflection profiles and bottom sampling were used to measure the volume of sediments accumulated in Long Island Sound. There is present 10 to the 10th power cu m of sediment of which 5.3 X 10 to the 9th power cu m is marine mud and 4.9 X 10 to the 8th power cu m is probably of premarine, lacustrine origin. The balance consists of reworked sand derived from glacial drift. The acoustically determined subbottom structure of the Sound and available sea level data indicate that the Sound basin was occupied by a large lake for at least 6,000 years and has been an arm of the sea since 8,000 years b.p. The volume of lacustrine sediment was accounted for by direct riverine input over 6,000 years, but the volume of marine mud present substantially exceeds the riverine supply over 8,000 years. The Sound was shown to act as a trap for sediments originating on the continental shelf. (Humphreys-ISWS)
W77-03323

RELATIONSHIPS BETWEEN SAND INPUT FROM RIVERS AND THE COMPOSITION OF SANDS FROM THE BEACHES OF SOUTHERN CALIFORNIA,
University of Southern California, Los Angeles. Dept. of Geological Sciences.
R. M. Rice, D. S. Gorsline, and R. H. Osborne.
Sedimentology, Vol. 23, No. 5, p 689-703, October 1976. 3 fig, 4 tab, 41 ref.

Descriptors: *Sands, *Beaches, *California, Rivers, Heavy metals, Coasts, Sediment transport, Streams, Sedimentation, Geology.
Identifiers: *Heavy mineral distribution, *Santa Clara River(Calif), Coastal zones, Principal component analysis, Discriminant function analysis.

During the period from 1967 through 1972, a sampling program was completed to determine the economic potential of heavy metals in the beach and river sands of the southern California coastal zone. These samples were employed to test the hypothesis that sand composition in a given beach cell is dominantly controlled by the provenance draining into that cell and is not strongly influenced by longshore leakage from upcurrent cells. Sample sets obtained before and after the exceptional flood of 1969 made it possible to compare the sediment supplied by normal river flow with that supplied by a major flood. Multivariate statistical analysis of the heavy mineral distribution of southern California beaches and rivers indicated that the sand composition of the two northern cells is controlled by the dominantly sedimentary Transverse Range provenance, whereas the composition of the three southern cells is controlled by the dioritic Peninsular Ranges. Some leakage occurs between the two northern cells around the Point Dume-Hueneme-Mugu Canyon Zone, whereas no important southward mixing occurs between cells around the Palos Verdes-Redondo Canyon Zone. Even though the Santa Clara River flows mostly through sedimentary terrains, samples from this river strongly reflect the granodioritic source present in its headlands. Although the basic sand composition within each cell persists during major flooding, leakage between cells may increase following flooding, and the compositional packages present may show evidence of greater mixing. (Lee-ISWS)
W77-03324

A CINE-CAMERA TECHNIQUE FOR PROCESS MEASUREMENT ON A RIDGE AND RUNNEL BEACH,
Reading Univ. (England). Dept. of Geology; and Reading Univ. (England). Sedimentology Research Lab.
P. Wright.
Sedimentology, Vol. 23, No. 5, p 705-712, October 1976. 3 fig, 12 ref.

Descriptors: *Beaches, *Beach erosion, Coasts, Rocks, Hydrology, Sea water, Ripple marks, Geology, Waves(Water), Photography, *Measurement.
Identifiers: *Bed forms, Rock records, Swash-backwash action, Cine-camera technique, Sea ridge, Runnel beach, Photographic method.

Previous attempts to quantify beach processes with techniques involving direct measurement have met with varying degrees of success. Problems encountered can be attributed to three main areas of difficulty: (1) the rapidity of change in both process operation and the subsequent production and development of bed forms; (2) the inclement nature of the weather conditions during which the most rapid beach changes take place; and (3) interference by the equipment with the flows being measured. A photographic method was described here which, to a great extent, overcor es these problems and can be operated ch ply by a solitary field investigator. (Lee-ISW)
W77-03325

LARGE SAND WAVES ON THE ATLANTIC OUTER CONTINENTAL SHELF AROUND WILMINGTON CANYON, OFF EASTERN UNITED STATES,
Geological Survey, Boston, Mass.
H. J. Knebel, and D. W. Folger.
Marine Geology, Vol 22, No 1, p M7-M15, September 1976. 3 fig, 25 ref.

Descriptors: *Sediment transport, *Sands, *Atlantic Ocean, *Continental Shelf, *Sand waves, Data collections, Ocean currents, Storms, Analytical techniques, Seismic studies.
Identifiers: *Wilmington Canyon, *Outer Continental Shelf.

New seismic-reflection data show that large sand waves near the head of Wilmington Canyon on the Atlantic Outer Continental Shelf have a spacing 100-650 m and a relief of 2-9 m. The bedfor trend northwest and are asymmetrical, the steep slopes being toward the south or west. Vibrac sediments indicate that the waves apparently ha formed on a substrate of relict nearshore se ments. Although the age of the original bedfor is unknown, the asymmetry is consistent with dominant westerly to southerly drift in this a which has been determined by other methods; asymmetry, therefore, is probably modern. Obs vations in the sand-wave area during August 19 revealed weak bottom currents, sediment biot bation, unrippled microtopography, and lack scour. Thus, the asymmetry may be maintained periodic water motion, possibly associated w storms or perhaps with flow in the canyon he (Woodard-USGS)
W77-03332

WINTER CONDITIONS IN TE NEW YO BIGHT, 1973-1974.
Grumman Ecosystems Corp., Bethpage, N. and Lawler, Matusky and Skelly Engineers, T pan, N. Y.
For primary bibliographic entry see Field 5C.
W77-03380

ASSATEAGUE ECOLOGICAL STUDIES.
Maryland Univ., Solomons. Natural Resour Inst.
For primary bibliographic entry see Field 5C.
W77-03381

SEASONAL INTERACTIONS AMO ESTUARINE PRIMARY PRODUCERS A HERBIVORES,
Maryland Univ., Solomons, Md. Chesape Biological Lab.
D. R. Heinle, S. Richman, S. D. Van Valkenbur and J. D. Allan.
Available from the National Technical Infor tion Service, Springfield, VA 22161 as ORO 48 Price codes: A03 in paper copy, A01 in microfi Progress Report, July 1975. 41 p, 18 fig, 16 ref. (40-1)-4848.

Descriptors: *Estuaries, *Copepods, *F habits, *Biomass, Biorhythms, Particle s *Chesapeake Bay, Zooplankton, Digest Crustaceans, Plankton, Seasonal, Instrume tion, Herbivores, Primary productivity, Maryla Identifiers: Eurytemora affinis, Acartia to Acartia clausi, Automated particle coun systems, *Patuxent River(Md).

Studies with an automated particle coun system of the feeding activities of Chesape Bay and Patuxent River copepods show t while adult Eurytemora affinis can ingest parti ranging in size from 3 to 24 millimicrons sphe equivalent diameter, their filtering rate is hig when ingesting particle sizes which correspon the mode of the particle biomass distribution. cordingly, the copepods vary their maximum tering rate in accordance with changes in tim the biomass peaks. The copepods Acartia to and Acartia clausi have similar feeding habits; in contrast to Eurytemora affinis, they prefer tively large particles of 20 millimicrons regard of biomass distribution. Concomitant testing comparisons with earlier research, primarily Eurytemora affinis, indicate that juve copepods in the nauplius stages feed rather selectiely over a broad range of particle sizes, a tendency toward higher filtering rates for la particles when such particles are fairly comm Moreover, maximum feeding efficiency at or concentration peaks appears to establish itse the early copepodite state and possibly even late nauplius stage. Laboratory pilot experim also show that the filtering rate of Eurytemor finis shows a threshold response with prey se tion switching from the small to the large parti (Harris-Wisconsin)
W77-03387

CAKUP FLOODING AND NUTRIENT
RCE OF COLVILLE RIVER DELTA DUR-
1973,
isiana State Univ., Baton Rouge. Coastal Stu-
Inst.
primary bibliographic entry see Field 5B.
-03388

COST OF COASTAL ZONING.
primary bibliographic entry see Field 6E.
-03535

SIBILITY OF TRANSPLANTATION,
EGETATION, AND RESTORATION OF
GRASS IN SAN DIEGO BAY, CALIFOR-
,
y Engineer Waterways Experiment Station,
sburg, Miss. Environmental Effects Lab.
primary bibliographic entry see Field 5G.
-03546

OUND WATER BASIN PROTECTION PRO-
TS: FREMONT SALINITY BARRIER.
fornia State Dept. of Water Resources, Sacra-
to.
primary bibliographic entry see Field 4B.
-03555

MODEL FOR THE CONTROL OF DIS-
VED MANGANESE IN THE INTERSTITIAL
TERS OF CHESAPEAKE BAY,
s Hopkins Univ., Baltimore, Md. Dept. of
h and Planetary Sciences.
primary bibliographic entry see Field 5B.
-03556

IABILITATION OF PAMLICO SOUND
TER PRODUCING GROUNDS DAMAGED
DESTROYED BY HURRICANE GINGER,
th Carolina Div. of Marine Fisheries, Raleigh.
primary bibliographic entry see Field 6B.
-03562

RDLES IN THE PATH OF COASTAL PLAN
LEMENTATION,
primary bibliographic entry see Field 6B.
-03582

CLOSER LOOK AT SOME ISSUES FOR
ERA-OCEANS POLICY, MARINE EN-
ONMENT, AND FISHERIES,
mbia Univ., New York. School of Law.
primary bibliographic entry see Field 6E.
-03585

IRONMENTAL CONCERN AS A FACTOR
COASTAL ZONE DEVELOPMENT: A
DY OF LOUISIANA CITIZENS,
isiana State Univ., Baton Rouge. Dept. of
l Sociology Research.
primary bibliographic entry see Field 6G.
-03590

MING SHOWDOWN: OCEAN NATIONAL-
AND THE SENATE 200-MILE SHELF
,
nova Univ., Pa. Inst. of World Order
arch.
primary bibliographic entry see Field 6E.
-03591

THWEST MARICULTURE LAWS,
on State Univ., Corvallis. Sea Grant Coll.
ram; and Oregon State Univ., Ocean
urces Law Program.
primary bibliographic entry see Field 6E.
-03598

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

ONE PASS SEAWATER DESALTING RO PILOT PLANT EVALUATION,
Du Pont de Nemours (E. I.) and Co., Wilmington, Del.
P. P. Goodwyn.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 207, Price codes: A06 in paper copy, A01 in microfiche. OWRT/S--77/1, Final Report, June 1976. 95 p, 15 tab, 7 fig, 13 ref. OWRT 14-34-0001-6507.

Descriptors: Desalination, *Desalination processes, *Membrane processes, *Reverse osmosis, Sea water, *Pilot plants, Estimated costs, Pre-treatment(Water).
Identifiers: Polyamide hollow fiber permeators, Dechlorination, Fouling control, Cost estimates, Wrightsville Beach(NC).

Results obtained with three different modes of biological fouling control for reverse osmosis seawater systems, as tested at the OWRT Wrightsville Beach Test Facility (WBTF), are discussed. Modes tested were (1) chlorination followed by carbon dechlorination; (2) chemical dechlorination with sodium bisulfite instead of carbon; (3) ultraviolet (UV) irradiation instead of chlorination/dechlorination. Polyamide hollow fiber reverse osmosis permeators operating at 800 psi and desalting seawater in a single stage were used in these tests. Collectively, the RO test systems produced about 15,000 gpd of potable water. Either UV or chlorine treatment with bisulfite dechlorination was as effective as chlorination with carbon treatment in maintaining stable performance in this test. Earlier cost analyses were revised to reflect more realistic bases. Carbon treatment was substantially more expensive than either of the other options. Demonstrated service life for 4-inch and 8-inch diameter polyamide hollow fiber RO permeators was extended to more than 6000 and 4000 hours, respectively. Operating experience, recommended pretreatment procedure and suggested further studies are discussed. (OWRT)
W77-03076

STUDIES ON A MECHANISM FOR SALT REJECTION IN REVERSE OSMOSIS MEMBRANES AS A GUIDE TO IMPROVED MATERIALS FOR DESALINATION OF SEA WATER.
Pittsburgh Univ., Pa.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 410, Price codes: A05 in paper copy, A01 in microfiche. OWRT/S--77/2, Final Report, 1976, 74 p. OWRT 14-30-3241.

Descriptors: *Desalination processes, Sea water, *Reverse osmosis, *Membranes, *Membrane processes, Matherials, *Ion transport, *Anion exchange, Aqueous solution, Chemical analysis, *Spectroscopy, Ion exchange, Hydration.
Identifiers: *Cellulose acetate membranes, Nonaqueous media, Electron spectroscopy, Flame emission spectroscopy, Phosphorylated cellulose acetate membranes.

This report is presented in two parts which describe studies of the interactions of ions with water in nonaqueous systems in general and in reverse osmosis membranes in particular. The first part describes studies of cellulose acetate membranes which have been treated with aqueous salt solutions. The membranes were studied by ESCA (Electron Spectroscopy for Chemical Analysis) and by Flame Emission Spectroscopy. It is shown that sodium ions penetrate and are retained in the membranes, even after rinsing and that their interaction appears to be particularly strong in the active side of the asymmetrical membranes. An attempt was also made to prepare an effective phosphorylated cellulose acetate membrane which should show superior resistance to hydrolysis at high pH. This phase of the project was not completed, but a recent Japanese patent shows that such membranes may be operable. Further development of such membranes is recommended. The second part of the report describes studies of the hydration of anions in non-polar non-hydrolysis solvents. The resulting free energies of hydration are related to a large number of other water - ion interactions. It is suggested that ion separation by membranes can be profitably regarded in terms of the energy required for dehydration rather than as the consequence of some kind of ion-rejection by the membrane.
W77-03290

3B. Water Yield Improvement

PLASTIC-REINFORCED ASPHALT SEEPAGE BARRIER,
Arizona Water Resources Research Center, Tucson.
R. K. Frobel, and C. B. Cluff.
Paper Reprint, Journal of the Irrigation and Drainage Division, ASCE, Vol. 102, No. IR3, Proc. Paper 12430, September, 1976. p. 369-380. 8 fig, 1 tab, 8 ref. OWRT A-059-ARIZ(3). 14-31-0001-5003.

Descriptors: Adhesion, *Asphalts, Linings, Membranes, *Plastics, *Reinforcement, *Seepage, Water resources, *Barriers, Equipment, Testing.
Identifiers: *Puncture resistance.

This report is concerned with laboratory equipment development, laboratory testing, and field investigations of a water seepage barrier consisting of plastic-reinforced asphalt. Three testing methods were utilized and evaluated in the asphalt-plastic-asphalt-chip-coated (APAC) membrane investigation. The first test method evaluated the hydrostatic puncture resistance of an asphalt-polyethylene combination. This test confirmed the hypothesis that the asphalt effectively increases the puncture resistance of the APAC membrane over that of plain polyethylene. The second test investigated the slope stability of a protective APAC chip seal. It was found that a typical 3/8-in. (9.5-mm) cover aggregate remained stable on constructed slopes of 3:1 and 4:1 and also remained stable on a 2:1 slope up to a surface temperature of 122F (50C). The third test method evaluated adhesive materials and determined the best suited adhesive for sealing polyethylene overlaps. Subsequent field investigations resulted in equipment development that increased construction efficiency in the installation of the APAC membrane.
W77-03120

A COMPARISON OF SEASONAL PRIMARY PRODUCTION OF MOJAVE DESERT SHRUBS DURING WET AND DRY YEARS,
EG and G Environmental Consultants, Denver, Colo.
For primary bibliographic entry see Field 2I.
W77-03138

AFFORESTATION IN LOW RAINFALL AREAS,
Department of Forestry, Pretoria (South Africa).
For primary bibliographic entry see Field 4D.
W77-03139

COMPARATIVE PHOTOSYNTHETIC PRODUCTION OF MOJAVE DESERT SHRUBS,
California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.
For primary bibliographic entry see Field 2D.

W77-03141

WEATHER MODIFICATION DESIGN STUDY FOR STREAMFLOW AUGMENTATION IN THE NORTHERN SIERRA NEVADA, EXECUTIVE SUMMARY,
M and B Associates, San Ramon, Calif.
C. C. Lovell, A. K. Goroch, and K. W. Chu.
Report MB-R-76/75A, July 1975. 38 p, 2 fig, 116 ref. Prepared for Bureau of Reclamation, Denver, Colorado, Engineering Research Center. Bur Reclam 14-06-D-7659.

Descriptors: *Storms, Snowfall, Snowpacks, Climatology, Precipitation(Atmospheric), *Cloud seeding, Hydrology, *Weather modification, Experimental design, *Cloud physics, Streamflow.
Identifiers: *Sierra Nevada region, *Winter storms, *Mesoscale, Climatology.

Results are presented of a design study for a pilot program to augment snowpack in the Sierra Nevada. The background for the program includes a review of the synoptic and mesoscale climatology and the cloud physics of winter storms in the area. The climatology and cloud physics relationships to precipitation occurrence, rate, and duration within the river basins under consideration are established. A hydrology model was used to estimate the run-off enhancement potential as a function of the type of precipitation and target areas. The result of these simulations is followed by a review of the state of cloud model development and of possible uses of models in a pilot program. Finally, the seeding potential of Sierra Nevada storms is explored. This background information is synthesized to form a physical model of precipitation mechanisms in the Sierra Nevada. The model establishes a set of hypotheses which, in turn, form the basis of the experimental design for the pilot program. The operational requirements are presented in another volume. (See W77-03213 thru W77-03215) (Bur Reclam)
W77-03212

WEATHER MODIFICATION DESIGN STUDY FOR STREAMFLOW AUGMENTATION IN THE NORTHERN SIERRA NEVADA, VOLUME I - METEOROLOGY AND HYDROLOGY OF THE NORTHERN SIERRA NEVADA, FINAL REPORT.
M and B Associates, San Ramon, Calif.
Report MB-R-76/75A, July 1976. 161 p, 25 fig, 3 tab, 116 ref, 2 append. Prepared for Bureau of Reclamation, Denver, Colorado, Engineering and Research Center. BuRec 14-06-D-7659.

Descriptors: *Weather modification, *Meteorology, Hydrology, Reviews, *Cloud physics, *Model studies, *Climatology, Nucleation, Synoptic analysis, *Storms, Snowfall, River basins, Streamflow, Runoff, Simulation analysis, Precipitation(Atmospheric), Data collections, Data processing.
Identifiers: *Sierra Nevada region, Meso-scale climatology, Winter storms.

This first volume presents a review of the setting for the program, including the meteorology and hydrology of the Central and Northern Sierra Nevada, a review of the state of knowledge of the cloud physics, and associated models with possible applicability to the region. The first part of this volume is intended to provide a complete background for the design. It begins with a review of the synoptic and meso-scale climatology of the Sierra Nevada, followed by a similar review of the state of knowledge of the cloud physics of winter storms in this region. The result of a statistical study of snowfall relationships within the river basins under consideration is presented. Precipitation rates and duration as a function of elevation are related to the climatology and cloud physics peculiar to Sierra Nevada winter storms. The results of the hydrology portion of the study are presented with an emphasis on the run-off enhancement potential as a function of the type of precipitation and target area. Then a review of the possible uses of simulation models in a pilot program and the state of model development available for these applications is discussed. (See also W77-03212) (Bureau of Reclamation)
W77-03213

WEATHER MODIFICATION DESIGN STUDY FOR STREAMFLOW AUGMENTATION IN THE NORTHERN SIERRA NEVADA, VOLUME II - PHYSICAL AND STATISTICAL DESIGN, FINAL REPORT.
M and B Associates, San Ramon, Calif.
Report MB-R-76/75A, July 1976. 73 p, 1 fig, 6 tab, 116 ref. Prepared for: Bureau of Reclamation, Denver, Colorado, Engineering and Research Center. BuRec 14-06-D-7659.

Descriptors: *Weather modification, *Meteorology, Hydrology, Reviews, *Cloud physics, *Model studies, *Climatology, Nucleation, Synoptic analysis, *Storms, Snowfall, River basins, Streamflow, Runoff, Simulation analysis, Precipitation(Atmospheric), Data collections, Data processing.
Identifiers: *Sierra Nevada region, Meso-scale climatology, Winter storms.

This second volume presents a physical model for snow augmentation based on the background and analysis presented in Volume I. (See W77-03213) This model of seedable alternatives for the Sierra Nevada provides the basis for a series of physical hypotheses for snowfall enhancement. These hypotheses are structured in such a way as to provide the basis for an experimental design for the assessment of the augmentation potential in Sierra Nevada winter storms. The statistical design for the experiment has been developed and is also presented in this volume. The design is structured against the hypotheses developed in the first sections of this volume and is based on the statistics of the precipitation in the Sierra Nevada presented in Volume I. (See also W77-03212.) (Bureau of Reclamation)
W77-03214

WEATHER MODIFICATION DESIGN STUDY FOR STREAMFLOW AUGMENTATION IN THE NORTHERN SIERRA NEVADA, VOLUME III - OPERATIONAL DESIGN, FINAL REPORT.
M and B Associates, San Ramon, Calif.
Report MB-R-76/75A, July 1976. 83 p, 12 fig, 5 tab, 116 ref. Prepared for: Bureau of Reclamation, Denver, Colorado, Engineering and Research Center. BuRec 14-06-D-7659.

Descriptors: *Weather modification, *Cloud seeding, Storms, *Snowpacks, *Design criteria, Design data, Design storm, *Optimization, Streamflow, Forecasting, Meteorology, Precipitation(Atmospheric), Costs, Operations.
Identifiers: *Snow augmentation, *American River drainage basin, *Sierra Nevada region.

This third volume discusses the specific recommendations for the operational design of the snow augmentation project in the Sierra Nevada. Volumes I and II (See W77-03213 and W77-03214) contain the background information and scientific analyses which provided the rationale for making the specific recommendations contained in this volume. Recommended forecasting procedures, daily operating procedures, and evaluation procedures are contained in the first three sections. The fourth section discusses various hardware systems. Several programs in the Sierra Nevada have shown that weather modification is technically feasible. The primary goals of the project are further development of the technology of when and how to optimally seed the storms and to evaluate the effectiveness of cloud seeding for the augmentation of snowpack. The optimum snow augmentation technique for conditions peculiar to the Sierra Nevada was identified and a plan for implmenting the technique was developed. [illegible] statistical design was formulated which wo[illegible] most efficiently measure the effectiveness of [illegible] snow augmentation technique. Major aspects [illegible] the recommended design are: a randomized [illegible] periment involving the entire target area; util[illegible] tion of both forecasts and real time data for [illegible] declaration of experimental days; a basic exp[illegible] mental unit of a 24-hour period; and seeding c[illegible] ducted by both ground-based generators and [illegible] borne generators. (See also W77-03212) (Bureau Reclamation)
W77-03215

ELECTROSTATIC INDUCTION PARAMETE[illegible] TO ATTAIN MAXIMUM SPRAY CHARGE [illegible] CLEAR FOG,
Naval Weapons Center, China Lake, C[illegible] Research Dept.
J. W. Carroz, and P. N. Keller.
Available from the National Technical Infor[illegible] tion Service, Springfield, VA 22161 as AD-A[illegible] 483, Price codes: A03 in paper copy, A0[illegible] microfiche. Report NWC TP 5796, January 1[illegible] 30 p, 11 fig, 1 tab, 29 ref.

Descriptors: *Weather modification, *[illegible] *Sprays, Spraying, Laboratory tests, Equipm[illegible] Nozzles, Droplets, Drops(Fluid), Conducti[illegible] Electrical conductance, Electrical coronas, E[illegible] trical studies.
Identifiers: *Fog clearing, *Spray charge, Elec[illegible] static induction.

Laboratory experiments using sprays of cha[illegible] drops were conducted to support a fog clea[illegible] program. Sprays from 1-g/s hollow-cone indus[illegible] spray nozzles were induction-charged to [illegible] quarter of the Rayleigh charged drop stab[illegible] limit. As the nozzle size was increased, a sm[illegible] fraction of the Rayleigh stability limit [illegible] achieved. Increasing the airflow past the nozzl[illegible] creased the charge on the spray. Increasing in[illegible] tion surface, fluid conductivity, and voltage[illegible] creased the spray charge to a limit beyond w[illegible] further increases decreased the spray charge[illegible] creasing the fluid pressure increased the [illegible] spray current but not the charge-to-mass ratio. [illegible] laboratory data agree with a qualitative deriva[illegible] relating drop charge to the nozzle spray geom[illegible] The derivation shows that the greatest charg[illegible] mass ratio will be achieved with narrow-c[illegible] angle nozzles. (Sims-ISWS)
W77-03299

ARTIFICIAL MODIFICATION OF [illegible] MOSPHERIC PROCESSES,
Ye. Ye. Komiyenko, L. A. Mirmovich, and K. [illegible] Orlov.
Report JPRS 66267, December 2, 1975. 19 p, 7 [illegible] 4 tab, 22 ref. Translation of Fizika Oblakov i [illegible] tivnykh Vozdeystiviy, Trudy Ukrainsk[illegible] Nauchno - Issledovatel' Si[illegible] Gidrometeorologicheskogo Instituta, No. [illegible] 1973.

Descriptors: *Weather modification, *C[illegible] physics, *Precipitation(Atmospheric), Clo[illegible] Cloud seeding, Aircraft, Instrumentation, [illegible] processing, Regression analysis, On-site inves[illegible] tions, Artificial precipitation, Statistics, Analy[illegible] techniques, Meteorology.
Identifiers: *USSR.

The report contained data on the problem[illegible] planning experiments on the modification of [illegible] mulonimbus clouds for artificial precipita[illegible] regulation. The report also described peculiar[illegible] of 'flying laboratories' which are used to [illegible] vestigate artificial modification of atmosph[illegible] processes. (Sims-ISWS)
W77-03303

THE REGULATION OF TRANSPIRATION [illegible] PENDITURE OF MOISTURE BY PLANTS W[illegible]

AID OF ANTITRANSPIRANTS, (IN RUS-
),
ovskii Lesotekhnicheskii Institut (USSR).
Dadykin, and A. D. Potapova.
kad Nauk Sssr Ser Biol 2, p 262-274, 1975.

riptors: *Transpiration, *Transpiration con-
*Antitranspirants, Soil moisture, Thin films,
ners, Moisture stress, Drought resistance,
water-plant relationships.

ous polymer materials were used as antitrans-
ts, forming on the leaves thin, transparent,
c films, as well as a number of chemical com-
ds causing the closing of guard cells. An-
spirants of the membraneous type are more
ising. The application of antitranspirants is
effective under conditions of sufficient soil
ure. Antitranspirants help the plants to en-
humidity stresses: temporary drought, dry
s, transplantation, etc.
03475

Use Of Water Of Impaired uality

TORS OF SOIL SALINIZATION DURING GATION IN THE TURAN LOWLAND, (IN IAN),
rimary bibliographic entry see Field 2G.
03124

CTIONS OF HEAVY METALS WITH S WITH SPECIAL REGARD TO THEIR LICATION IN SEWAGE WASTES,
ourne Univ., Parkville (Australia). Dept. of ultural Chemistry.
rimary bibliographic entry see Field 5B.
03359

ECT OF ADDED SALTS ON NITROGEN EASED AND NITRATE LEVELS IN EST SOILS OF THE WASHINGTON STAL AREA,
ern Washington Research and Extension r, Puyallup.
rimary bibliographic entry see Field 2G.
03396

ER MANAGEMENT AND REGULATION ATER USE,
al and Southern Florida Flood Control Dis-
West Palm Beach.
rimary bibliographic entry see Field 6B.
03525

Conservation In Domestic and lunicipal Use

AL WATER SYSTEMS ARE FREQUENTLY LECTED,
is Univ. at Urbana-Champaign. Dept. of ultural Economics.
rimary bibliographic entry see Field 6B.
03121

ORIENTED SYSTEMS ANALYSIS FOR ONAL MUNICIPAL WATER SUPPLY INING,
State Univ., Logan. Coll. of Engineering.
rimary bibliographic entry see Field 6A.
03159

ER RESOURCES OF AUSTRALIA AND PATTERN OF POPULATION CONCEN-IONS,
rimary bibliographic entry see Field 6D.
03278

LAND BASED SEWAGE SLUDGE MANAGEMENT ALTERNATIVES FOR LOS ANGELES: EVALUATION AND COMPARISON,
California Univ., Los Angeles. School of Architecture and Urban Planning.
For primary bibliographic entry see Field 5D.
W77-03289

SPECIFIC ROLE OF LIME IN MUNICIPAL WASTE WATER TREATMENT-EXPECTATIONS AND REALITY (DIE SPEZIFISCHE ROLLE DES KALKS IN DER KOMMUNALEN ABWASSERREINIGUNG-ERWARTUNGEN UND REALITAETEN),
For primary bibliographic entry see Field 5D.
W77-03422

URBAN WATER USE IN CALIFORNIA.
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 6B.
W77-03549

3E. Conservation In Industry

UTILIZATION OF MUNICIPAL WASTE WATER FOR FROTH FLOTATION OF COPPER AND MOLYBDENUM SULFIDES,
Arizona Bureau of Mines, Tucson.
For primary bibliographic entry see Field 5D.
W77-03132

ELECTRIC POWER DEVELOPMENT IN THE PACIFIC NORTHWEST REGION: INSTITUTIONAL COMMITMENTS AND ALTERNATIVES, PHASE I,
Washington Univ., Seattle. Inst. for Environmental Studies.
For primary bibliographic entry see Field 6E.
W77-03288

PLAN OF STUDY OF THE HYDROLOGY OF THE MADISON LIMESTONE AND ASSOCIATED ROCKS IN PARTS OF MONTANA, NEBRASKA, NORTH DAKOTA, SOUTH DAKOTA, AND WYOMING.
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 4B.
W77-03338

HYDROLOGIC STUDIES BY THE U.S. GEOLOGICAL SURVEY IN OIL-SHALE AREAS OF COLORADO, UTAH, AND WYOMING, 1976.
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 4B.
W77-03340

INVESTIGATION OF THE PHYSICAL FEASIBILITY OF MOBILE FISH PROCESSING PLANTS,
Fisheries and Marine Service, Ottawa (Ontario). Research and Development Directorate.
For primary bibliographic entry see Field 6B.
W77-03558

FERMENTATION OF WASTE MATERIALS TO PRODUCE INDUSTRIAL INTERMEDIATES,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5D.
W77-03563

KEEP COOL WITH SEWAGE EFFLUENT - A TWO-WAY SAVING OF WATER,
R. Wood.
Process Engineering, p 71, June, 1976. 1 fig.

Descriptors: *Water reuse, *Sewage effluents, *Nitrification, *Cost analysis, *Cooling water, *Power plants, Recycling, Cleaning, Activated sludge.

A procedure using sewage effluent as cooling water in power plants was discussed. Croydon Power Station, built on top of a sewage works in Britain, was the example used. Treated effluent with borehole water for makeup has been successful. No metallic corrosion problems appeared and there was no need for manual cleaning of condensers or acid washing. The natural draught cooling towers acted as nitrifiers and the pond acted as an activated sludge system; thus, effluent quality was improved. The towers also maintained necessary nitrification during the winter. It was concluded that sewage effluent may be used in other applications to provide water savings. (Collins-FIRL)
W77-03578

3F. Conservation In Agriculture

ELECTRONIC SENSOR FOR LOW-TO-MEDIUM WINDSPEEDS,
Agricultural Research Service, Yakima, Wash.
For primary bibliographic entry see Field 7B.
W77-03099

TIME OF PLANTING EFFECTS ON DEVELOPMENT, YIELD, AND OIL QUALITY OF IRRIGATED SUNFLOWER,
Queensland Dept. of Primary Industries, Emerald (Australia).
G. D. Keefer, J. E. McAllister, E. S. Uridge, and B. W. Simpson.
Australian Journal of Experimental Agriculture and Animal Husbandry, Vol. 16, p 417-422, 1976. 3 fig, 11 ref.

Descriptors: *Crop response, *Oilseed crops, *Crop production, *Planting management, *Seeds, Irrigation, Climatic data, Soil types, Agronomic crops, Fertilizers, Crops, Time, Growth stages, Environmental effects, Plant diseases, Rusts, Surface irrigation, Australia, Irrigation programs.
Identifiers: *Sunflower.

In the summers of 1969-1970 and 1970-1971, investigations were undertaken to determine whether sunflower should be considered a possible crop for an irrigation project in northern Australia. Experiments were conducted on irrigated sunflower to determine the effect of time of planting on crop development, seed yield, and oil quality. In both seasons significantly higher seed and oil yields were obtained from a December planting. Lower yields at all times of planting in the second session were attributed to rust infection. A good correlation was obtained between oil quality and temperatures during the post flowering period. Oil quality improved with late sowing in association with lowered temperatures. Results of the two trials indicate that mid to late December or possibly January are the best planting months for irrigated sunflower. Rust-resistant cultivars or rust control methods would be necessary to ensure high yields in all seasons, particularly from late planted crops. (Jamail-Arizona)
W77-03135

EFFECT OF WATER STRESS ON THE PHASIC DEVELOPMENT OF ANNUAL MEDICAGO SPECIES,
Queensland Dept. of Primary Industries, Warwick (Australia).
For primary bibliographic entry see Field 2I.
W77-03136

SOIL MOISTURE DISTRIBUTION UNDER WIDE-BED, NARROW-ROW, AND CONVENTIONAL-ROW COTTON,
Arizona Univ., Tucson. Dept. of Soils, Water and Engineering.

H. Gessesse.
Master of Science Thesis, 1976. 51 p, 8 fig, 4 tab, 31 ref, append.

Descriptors: *Irrigation efficiency, *Irrigation practices, *Irrigation effects, *Furrow irrigation, *Moisture content, Soil moisture, Furrows, Crop production, Irrigation, Irrigation systems, Soil-water-plant relationships, Surface irrigation, Water conservation, Cultivation, *Cotton, Moisture tension, Moisture uptake.

The effect of furrow spacing on the moisture distribution pattern under cotton was investigated. Vertical and lateral soil moisture distributions were studied under two methods of row spacings. Results indicated that conventional rows had more soil moisture during the entire season, compared to wide-bed, narrow-rows. However, conventional rows received higher quantities of water at each irrigation. A large percentage of the soil moisture was depleted from the top 90 centimeters of soil under both row spacings. When average lint yields per hectare were compared, conventional row spacing with preirrigation gave best results. Conventional irrigated up, wide-bed preirrigated, and wide-bed irrigated up gave similar results. When the average seed cotton yields per hectare were compared, conventional row preirrigated, conventional row irrigated up, wide-bed, narrow-row preirrigated, and wide-bed, narrow-row irrigated up gave similiar results. (Jamail-Arizona)
W77-03137

EFFECT OF DROUGHT STRESS FREQUENCIES AT DIFFERENT GROWTH STAGES ON CORN YIELD,
Alexandria Univ. (Egypt). Dept. of Soil and Water Science; and Tanta Univ. (Egypt). Dept of Soil and Water Science.
H. M. A. Bakr, S. A. Gaheen, and M. A. Mohammed.
Alexandria Journal of Agricultural Research, Vol. 23, No. 3, p 643-651, December, 1975. 10 tab, 18 ref.

Descriptors: *Corn(Field), *Irrigation practices, *Moisture stress, *Crop response, *Irrigation effects, Frequency, Droughts, Stress, Crop production, Irrigation, Irrigation water, Soil moisture, Moisture content, Field capacity, Growth stages, Semiarid climates, Root zone, Soil types, Water conservation.

A study of irrigation frequencies was carried out at the Sakha Agricultural Experimental Station in two successive growing seasons. The objective was to compare normal quantities of irrigation water used by Egyptian farmers with those calculated for the soil moisture content at the field capacity plus 10 percent to be added at different growth stages of corn. The experiment was designed according to completely random blocks of six treatments, each of eight replicates. Results show that the treatment where eight calculated waterings were applied without any drought stress during the growing season had the highest corn yield. Assuming similar field conditions, corn production in Egypt could be increased by two hundred and ten million kilograms. In addition, a great amount of irrigation water could be saved. The importance of the first irrigation is also pointed out. It's prevention significantly reduces the number of plants. (Jamail-Arizona)
W77-03143

EVAPOTRANSPIRATION REDUCTION BY FIELD GEOMETRY EFFECTS,
Oklahoma State Univ., Stillwater. Dept. of Agronomy.
For primary bibliographic entry see Field 2D.
W77-03169

DETERMINING THE MOST PROFITABLE NITROGEN FERTILIZATION FOR CORN PRODUCTION,
Tennessee Univ., Knoxville. Agricultural Experiment Station.
W. L. Parks, and J. Overton.
Tennessee Farm and Home Science Progress Report 98, April-June 1976, p 26-28. 1 fig, 3 tab. OWRT A-017-TENN(5). 14-31-001-3843.

Descriptors: *Fertilization, *Nitrogen, *Corn(Field), *Crop production, Rainfall, Soil moisture, Tennessee.

In determining the most profitable rate for nitrogen fertilization for corn, it is essential that nitrogen fertilization rate experiments be conducted at different locations in the state through several years. It is also essential that the rainfall distribution pattern and soil moisture utilization patterns during these experiments be adequately measured and complete records obtained. Once these yield data, rainfall, and moisture information have been obtained in a number of places across the state, it is possible to combine these data with the weather history that has been accumulated over much longer periods of time and arrive at the probable best nitrogen fertilization rate for use in a given area on corn. This research developed response relationships from a 3-year corn-nitrogen experiment at the West Tennessee Experiment Station at Jackson, Tennessee and expressed corn yields as a function of nitrogen (N) rate and drought intensity. (Larson-Tennessee)
W77-03172

A COMPUTER PROGRAM FOR ESTIMATING COSTS OF OWNING AND OPERATING AN IRRIGATION WELL UNDER CONDITIONS OF DECLINING WATER LEVELS,
Washington State Univ., Pullman. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6C.
W77-03211

EFFECTS OF SOIL-MOISTURE REGIMES ON THE GROWTH OF BARLEY,
Arizona Univ., Tucson. Dept. of Agronomy and Plant Genetics.
A. D. Day, and R. K. Thompson.
Agronomy Journal, Vol 67, No 3, p 430-432, May-June 1975. 4 tab, 9 ref.

Descriptors: *Moisture stress, *Soil water, *Barley, *Crop response, Irrigation, Irrigation effects.

Effects of soil-moisture stress at three different stages of growth (jointing, flowering, and dough) on grain yield, grain quality, and plant growth of Spring barley planted in November were studied under the field conditions at Mesa, Arizona. The experiment was conducted to determine the limitations to irrigation water conservation in a semi arid environment. Four by four Latin square designs were used to compare four irrigation treatments. Effects of soil-moisture stress for 7 days at the jointing, flowering, and dough stages of growth and/or until 100% of available water in the first 3 feet of soil was depleted were compared with plants not stressed. Withholding irrigation water during the jointing stage of growth did not reduce and in some cases increased grain yields. Moisture stress at the flowering and dough stages of growth decreased grain yield. Moisture stress at the dough lowered grain bushel-weight. Stressing barley for water at jointing resulted in shorter plants, less lodging, more tillering, and more heads per unit area. Moisture stress at flowering and the dough stage decreased seeds per head and seed weight, respectively. Cultivars differed in response to soil-moisture stress. Adequate soil-moisture must be provided throughout the growing season for maximum yields of high quality grain from Spring barley grown as a Winter-annual under irrigation. (Skogerboe-Colo St)
W77-03216

DIURNAL FLUCTUATION OF LEAF-WATER POTENTIAL OF CORN AS INFLUENCED BY SOIL MATRIC POTENTIAL AND MICROCLIMATE,
Agricultural Research Service, Florence, S. C. Coastal Plains Soil and Water Conservation Research Center.
D. C. Reicosky, R. B. Campbell, and C. W. Doty.
Agronomy Journal Vol. 67, No. 3, p 380-385, May-June 1975. 4 fig, 1 tab, 21 ref.

Descriptors: *Microclimatology, *Moisture stress, *Moisture tension, *Crop response, *Corn(Field), Irrigation, Irrigation effects, Crop production.
Identifiers: *Leaf water potential, *Soil matric potential.

Water stress during critical growth periods is frequently the limiting factor in crop production. However few data are available on the variation of plant water status under field conditions. The object of this work was to quantify the effect of soil matric potential on plant water status. Sweet corn was grown on a Varina sandy loam soil to determine the effect of the microclimate and irrigation on leaf water potential. Soil water stress was imposed naturally and by use of automated portable shelters that covered the plots during rainfall. Leaf-water potential was closely related to the diurnal change of incoming energy. A maximum leaf-water potential of -1.5 bars occurred just prior to sunrise. The minimum value, which occurred during the peak radiation load or stress, was dependent on soil matric potential and stage of plant development. (Skogerboe-Colo St)
W77-03394

VEGETATIVE WATER USE IN CALIFORNIA 1974.
California State Dept. of Water Resources, Sacramento. Water Use Programs.
Bulletin No. 113-3, April 1975. 115 p, 3 fig, 35 tab, 2 plates, 24 ref, 10 append.

Descriptors: *Evapotranspiration, *Evaporation, *California, *Irrigation, *Water demand, Hydrologic cycle, Irrigation effects, Evapotranspiration control, Water conservation, Water yield improvement, Transpiration, Vegetable crops, Irrigation water, Irrigation efficiency, Water requirements, Crop production, Water distribution(Applied), Water allocation(Policy).

One year's summary data by month, are provided for agricultural water use in California--which accounts for 85% of the state's total water use. Information is given for the three components of agricultural water use (crop-growing season evapotranspiration, applied water evapotranspiration, and applied water requirements) in estimations subdefined for the principal irrigated crops in various zones of particular agricultural importance to the state. Evaporative demand data include agroclimatic field studies, evaporative demand zones, and coastal evaporative gradient. Evapotranspiration data is given for measured evapotranspiration, correlating measured evapotranspiration to evaporation, transfer of data, correction evaluations, estimating crop growing season evapotranspiration and estimating evapotranspiration of applied water. Data on average applied water requirements is supplied for nine zones of agricultural importance, including information on high and low values found within each area. Other data supplied with the study includes a summary of observed evaporation from Class 'A' pans located in irrigated pasture environments, observed monthly net atmometer evaporation, observed incoming solar radiation, and information concerning grass evapotranspiration. (Harris-Wisconsin)
W77-03554

I. WATER QUANTITY MANAGEMENT AND CONTROL

IA. Control Of Water On The Surface

'ORRELATION ANALYSIS OF IYDROMETEOROLOGICAL DATA,
'entral and Southern Florida Flood Control Dis-rict, West Palm Beach. Environmental Engineer-ng.
'or primary bibliographic entry see Field 2A.
V77-03086

'NDRAINED BEHAVIOR OF EMBANKMENTS)N NEW LISKEARD VARVED CLAY,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering: and Massachusetts Inst. of 'ech., Cambridge. Constructed Facilities Div.
'or primary bibliographic entry see Field 8D.
V77-03108

'TATE AND COUNTY AREA TABULATIONS 'OR THE COLORADO RIVER BASIN,
'ublic Health Service, Denver, Colo. Div. of Water Supply and Pollution Control.
'or primary bibliographic entry see Field 7C.
V77-03110

:ETRANSMISSION OF HYDROMETRIC DATA N CANADA,
Department of the Environment, Ottawa Ontario). Applied Hydrology Div.
or primary bibliographic entry see Field 7B.
V77-03111

;UIDELINES FOR FLASH FLOOD AND MALL TRIBUTARY FLOOD PREDICTION,
Jational Weather Service, Kansas City, Mo. Cen-ral Region.
.. A. Hughes, and L. L. Longsdorf.
Available from the National Technical Informa-ion Service, Springfield, VA 22161 as PB-247 569, 'rice codes: A02 in paper copy, A01 in microfiche. JOAA Technical Memorandum NWS CR-58, Oc-)ber 1975. 8 p.

)escriptors: *Flash floods, *Flood forecasting, Rainfall, *Radar, Forecasting, Floods, Thun-erstorms, Precipitation(Atmospheric), Excessive recipitation, Streamflow, Runoff, Hydrology, Meteorology.

'his technical note was devised to provide all of-ces with guidelines for determining the threat and xtent of flash floods and other small tributary oods. Basically, these guidelines involve nowledge of when, how much, and how fast rain ame down; how much of a particular river basin as involved; and some method for converting is data to river stage or flood potential. rocedures for using radar and rainfall measure-ents for prediction of flash floods were resented. (Sims-ISWS)
/77-03114

LASTIC-REINFORCED ASPHALT SEEPAGE ARRIER,
rizona Water Resources Research Center, Tuc-)n.
or primary bibliographic entry see Field 3B.
/77-03120

WO DIMENSIONAL BOTTOM /ITHDRAWAL FROM A DENSITY-TRATIFIED RESERVOIR,
'isconsin Univ., Madison. Dept. of Civil and En-ronmental Engineering.
C. Ho, and P. L. Monkmeyer.
Proc. International Association for Hydraulic Research, XVIth Congress, p 79-86, 1975. 4 fig, 10 ref. OWRT B-080-WIS(7), 14-31-0001-3948.

Descriptors: *Model studies, Engineering, *Equations, *Reservoir releases, *Density currents, *Stratification, *Withdrawal, Model studies.
Identifiers: *Viscous flow, *Transition flow, *Sinks, *Karman integral method.

Theoretical and experimental investigations are discussed on two-dimensional withdrawal of a viscous, non-diffusive and linearly-stratified fluid from the bottom of a reservoir. To account for the non-linear, inertial terms, a Karman integral method is used to solve the governing differential equations. A program of experiments is carried out in the laboratory and the results obtained indicate conclusively the adequateness of the relatively simple form of the horizontal velocity profile assumed and confirm very well theoretical relations for the withdrawal layer thickness and maximum horizontal velocity.
W77-03129

A PERTURBATION APPROACH TO TWO-DIMENSIONAL BOTTOM WITHDRAWAL FROM A DENSITY-STRATIFIED RESERVOIR,
Wisconsin Univ.-Madison. Dept. of Civil and Environmental Engineering.
J. C. Ho, and P. L. Monkmeyer.
Engineering Journal of Singapore, Vol. 2, 1975, p. 12-20. 2 fig, 5 ref. OWRT B-080-WIS(6). 14-31-0001-3948.

Descriptors: *Model studies, Engineering, *Equations, *Reservoir releases, *Density currents, *Stratification, *Withdrawal.
Identifiers: *Viscous flow, *Transition flow, *Perturbation method.

A perturbation method is used to study two-dimensional withdrawal of a viscous, non-diffusive, linearly-stratified fluid from the bottom of a reservoir. From the perturbation analysis, a criterion is developed to determine the validity of the linear solution obtained by Walesh and Monkmeyer.
W77-03151

AN APPRAISAL OF CONFLICTING INSTITUTIONAL ATTITUDES ON THE WESTWIDE STUDY REPORT.
Idaho Univ., Moscow. Water Resources Research Inst.
For primary bibliographic entry see Field 6B.
W77-03157

PRACTICAL ALTERNATIVES TO 2,4,5-T FOR CHEMICAL CONTROL OF BRUSH ALONG DRAINAGE DITCHES AND GENERAL WATERSHED USE,
Purdue Univ., Lafayette, Ind. Water Resources Research Center.
For primary bibliographic entry see Field 5G.
W77-03168

MULTIPLE USE IN THE SOUTHERN COASTAL PLAINS IN THE UNITED STATES,
Georgia Univ., Athens. School of Forest Resources.
For primary bibliographic entry see Field 4C.
W77-03173

FLOOD PLAIN INFORMATION: TUSCARAWAS AND ADJACENT TRIBUTARY AREAS, TUSCARAWAS COUNTY, OHIO.
Army Engineer District, Huntington, W. Va.
Prepared for the Ohio Department of Natural Resources, June 1973. 28 p, 9 fig, 17 plates, 6 tab.

Descriptors: *Floods, *Streamflow forecasting, *Flood profiles, *Flood plains, *Flood data, *Dams, *Reservoirs, *Ohio, Peak discharge, Obstruction to flow, Channel improvement.
Identifiers: *Tuscarawas River(OH), Sugar Creek(OH), Dover Dam, Beaverdam Creek(OH), Stillwater Creek(OH), Little Stillwater Creek(OH), Intermediate Regional Flood, Standard Project Flood.

The Tuscarawas River, draining 2,590 square miles, constitutes nearly 1/3 of the total Muskingum River Basin in central Ohio. The 42 river miles covered in this report slope at 2.1 feet per mile and are joined by 24.19 miles of tributaries which include Sugar Creek, Beaverdam Creek, Stillwater Creek, and Little Stillwater Creek. The meandering river, with valley widths ranging between 500 and 6,000 feet, flows westward, then southwesterly through agricultural lands interspersed with some industrial, commercial and residential development. Floods occur during all seasons, though the largest have occurred in the period of December to March. Along tributaries flood stages rise to peaks with high velocities in a relatively short period of time. On the river, a flood rises to its crest over a longer period. Flood damage reduction measures include 8 reservoirs as well as a channel improvement project on Little Stillwater Creek. The greatest flood occurred in March 1913, which crested at 806.5 msld with a peak discharge of 830,000 cubic feet per second. Loss was over $200,000. Damage in a 1935 flood was $6 million. An Intermediate Regional Flood (IRF) and Standard Project Flood (SPF) can be expected to crest at 793.2 msld and 799.3 feet msld respectively. Most bridges in the study area would obstruct flow during an SPF. During major floods water velocities in the Tuscarawas River channel range up to about 4.5 ft/sec. Velocities on tributary streams having steeper gradients may be even higher. Overbank velocities are about 2 ft/sec on the river and as high as 3.2 ft/sec on tributary streams. (Salzman-North Carolina)
W77-03174

FLOOD PLAIN INFORMATION: KASKASKIA RIVER AND TRIBUTARIES, COLES COUNTY, ILLINOIS,
Army Engineer District, St. Louis, MO.
Prepared for the County of Coles, Illinois, August 1972. 28 p, 10 fig, 22 plates, 4 tab.

Descriptors: *Floods, *Historic floods, *Flood damage, *Flood protection, *Flood plains, *Flood profiles, *Illinois, Flood data, Control structures, Levee, Channel improvement.
Identifiers: *Kaskaskia River(IL), Flood Plain Management Program, Crabapple Creek(IL), Whitley Creek(IL), Flat Branch(IL), Coles County(IL), Standard Project Flood, Intermediate Regional Flood.

Kaskaskia River flows through the undulating prairie of Coles County in southeastern Illinois and falls 17.6 feet in 20.6 miles through the study reach. The river drains about 400 square miles above Coles County. Its tributaries, Crabapple Creek, Whitley Creek and Flat Branch flow westerly into the river and have flood plains which vary from 125 to 1,500 feet. Kaskaskia River's flood plains, varying from 200 to 12,000 ft wide, consist of farmlands. Floods occur during all seasons with a relatively fast rate of rise, particularly in winter when rains fall on frozen ground. Most floods result from intense rainfall. Bridges, culverts and buildings and natural obstructions impede flood flow. Channel improvements along some of the tributaries and privately built levees have reduced damage from low-frequency floods but would not protect against the Intermediate Regional Flood or Standard Project Flood. The largest flood occurred on June 28, 1957, in the aftermath downpour from Hurricane Audrey. The Kaskaskia River crested at 636.2 feet (msld). Forty thousand acres of farmland were flooded and many families were forced to evacuate their

homes. An IRF and SPF have estimated elevations of 640.2 (msld) and 646.2 (msld) and peak discharges of 19,675 cubic feet per second and 52,448 cfs, respectively. Water velocities would be up to 5 ft/sec in the channel. (Salzman-North Carolina)
W77-03175

FLOOD PLAIN INFORMATION: SAN JUAN RIVER AND TRIBUTARIES, FARMINGTON, NEW MEXICO.
Army Engineer District, Sacramento, Calif.
Prepared for the City of Farmington and San Juan County, June 1975. 53 p, 20 fig, 37 plates, 7 tab.

Descriptors: *New Mexico, *Floods, *Flood profiles, *Historic floods, *Flood plains, *Flood protection, Flash flood, Streamflow forecasting, Maximum probable flood, Cloudbursts, Flood data, Flood frequency, Peak discharge, Flood peak, Erosion, Floodways, Non-structural alternatives, Building codes, Zoning, Control structures, Dams, Channel improvement, Floodproofing.
Identifiers: *Farmington(NM), *Animas River(NM), *Hood Arroyo(NM), *San Juan River(NM), *Farmington Glade(NM), *Wyper Arroyo(NM), *La Plata River(NM), *Porter Arroyo(NM), *Flora Vista Arroyo(NM), Standard Project Flood, Intermediate Regional Flood.

Properties along the streams are primarily agricultural and rural-residential. Population of Farmington, NM, is about 28,000 and is expected to reach 50,000 by year 2000. La Plata and Animas Rivers and Farmington Glade are tributaries of San Juan River. Four arroyos, Porter, Hood, Wyper and Flora Vista, are tributaries of Animas River. The San Juan River drains 7,250 sq mi at the downstream end of the study reach and the other streams drain areas varying from 1 to 1,360 sq mi. Floods can be caused by general rainfall, usually in September and October, snowmelt in May through July, and summer cloudburst storms. The 1911 flood is considered the largest ever known in the Farmington areas with an estimated peak flow of 30,000 cubic ft per second on the Animas River at Farmington. In an Intermediate Regional Flood, peak discharges of 34,500 cfs and 30,000 cfs are expected on San Juan, La Plata and Animas Rivers, respectively. The other streams will have varying discharges below 4,000 cfs. Water velocities will be 6 to 11 ft/sec in channels and 2 to 4 ft/sec in overbank areas. Floods would peak between 2.5 and 23.5 hrs, depending on the stream and remain at critical stage up to 66 hrs. In a Standard Project Flood, peak discharges of 50,000 cfs, 22,000 cfs and 45,000 cfs are predicted on San Juan, La Plata and Animas Rivers, respectively. The other streams will have discharges less than 10,000 cfs. This flood would peak in 2.5 to 29 hrs and remain at critical stage up to 93 hrs. Some of the 30 culverts, bridges, flumes and other structures will be obstructive to flow. Navajo Reservoir, 40 mi upstream from Farmington on San Juan River, provides some flood protection. Guidelines for reducing flood damages are included. (Smith-North Carolina)
W77-03176

FLOOD PLAIN INFORMATION: CONTOOCOOK RIVER AND NUBANUSIT BROOK, PETERBOROUGH, NEW HAMPSHIRE.
Army Engineer District, Waltham, Mass. New England Div.
April 1974. 35 p, 21 fig, 18 plates, 6 tab.

Descriptors: *Floods, *Flood data, *Flood stages, *Peak discharge, *Flood characteristics, *Bank erosion, *Flood plains, *Channels, *Ice jams, *Flood protection, *Dams, Flood flow, Historic floods, Flow duration, Control structures, *New Hampshire, Flood profiles.
Identifiers: *Contoocook River(NH), Nubanusit Brook(NH), Peterborough(NH), Flood Plain Management Program, MacDowell Reservoir(NH), Intermediate Regional Flood, Standard Project Flood.

The Contoocook River flows northerly through Peterborough, NH and discharges into the Merrimack River. With a total drainage area of 151 square miles above the study area, the river has a very steep, narrow stream valley through town's business district, sloping at an average of 16.1 feet per mile. Nubanusit Brook, which joins the river at Peterborough, drains 47 square miles and has a slope averaging 69.3 ft per mile. Flood plains in study area include residential, industrial and commercial property; however, deep channels confine most flooding within banks except beyond the business district where streams meander through broader flood plains. The MacDowell Flood Control Reservoir (1950) on the Nubanusit Brook minimizes flooding. Ice jams resulting from spring melting still constitute a problem. Floods occur during all seasons. River stages rise rapidly because of the river's numerous steep tributaries. September 1938 marked the greatest flood on the Contoocook River, cresting at 746.8 ft mean sealevel datum, with a peak discharge of 5,950 cubic ft/sec. Damage was over $500,000. An Intermediate Regional Flood and Standard Project Flood would have estimated peak discharges of 6,650 cfs and 10,650 cfs, respectively. Water velocities could reach 14 ft/sec in major floods. Similar flood conditions would result on Nubanusit Brook. Few bridges in the area would obstruct flood flow. (Salzman-North Carolina)
W77-03177

FLOOD PLAIN INFORMATION: CHICOPEE RIVER: CHICOPEE, SPRINGFIELD, LUDLOW, WILBRAHAM AND PALMER, MASSACHUSETTS.
Army Engineer District, Waltham, Mass. New England Div.
September 1973. 38 p, 20 fig, 10 plates, 5 tab.

Descriptors: *Floods, *Runoff, *Flood plains, *Flood protection, *Control structures, Flow duration, Flow characteristics, Flood data, Channel improvements, Floodwalls, Dams, Reservoirs, Planning, Obstruction to flow, Flood profiles, *Massachusetts.
Identifiers: *Chicopee River(MA), Quaboag River(MA), *Ware River(MA), *Swift River(MA), Springfield(MA), Chicopee(MA), Palmer(MA), Ludlow(MA), Wilbraham(MA), Flood damage reduction measures, Bare Falls Dam(MA), Conant Brook Dam(MA).

Flowing from its source at the confluence of the Ware and Quaboag Rivers near the community of Three Rivers in the town of Palmer, to its confluence with the Connecticut River at Chicopee, the river drains 721 sq mi and has three principal tributaries: the Quaboag, Ware and Swift Rivers. A number of smaller streams in the river system can also be sources of high runoff during intensive rain or rapid snowmelt. Certain areas of the usually narrow flood plain extend to 2,000 feet and contain residential, commercial and industrial development as well as open spaces under increasing pressure for development. Each of the five towns can be severly damaged by future floods. Floods occur during all seasons, particularly in Spring when snowmelt augments rainfall. Peak flood stages occur 6 to 24 hours after intense rainfall. Most of the 14 bridges spanning the river would obstruct flood flows in an Intermediate Regional Flood (IRF). Flood damage reduction measures include several local protection flood control projects, such as channel modifications, flood walls, dams and reservoirs. Highest recent flood occurred August 19, 1955 when the river crested at 22.14 ft and had a peak discharge of 40,500 cubic ft/sec. An IRF would crest at 16.5 ft, have a peak discharge of 35,500 cfs with channel velocities of 6-9 ft/sec. A Standard Project Flood would crest at 26.6 ft and have a peak discharge of 77,800 cfs with velocities averaging 8 to 12 ft/sec. (Salzman-North Carolina)
W77-03178

FLOOD PLAIN INFORMATION METROPOLITAN REGION, LINCOLN NEBRASKA: VOLUME I, SUMMARY REPORT SALT CREEK, HAINES BRANCH AND BEA SLOUGH, SALT CREEK BASIN.
Army Engineer District, Omaha, Nebr.
Prepared for Lincoln City-Lancaster Count Planning Commission. August 1964. 10 p, 5 fig, 1 plates.

Descriptors: *Nebraska, *Floods, *Flood profile *Historic floods, *Flood plains, Storms, Floo data, Snowmelt, Flood protection, Non-structur alternatives, Flood plain zoning, Building code Control structures, Reservoirs, Floodproofing.
Identifiers: Lincoln(NB), Beal Slough(NB), *Sa Creek(NB), Haines Branch(NB), 25-year floo 100-year flood.

The lower portions of the watersheds of t streams of this study are generally developed and around Lincoln, NB, while the upper portio are used for crops or pasture. Haines Branch is tributary of Salt Creek which is formed by t junction of the Olive and Hickman Branches. Be Slough enters Salt Creek at Lincoln. Lincoln co tinues to grow and its 1960 population of 128,000 expected to reach 231,000 by 1980. Flooding c be caused by heavy general rains in spring a summer, combined with snowmelt. On rare occ sions snowmelt alone causes flooding. Since 190 100 floods have been recorded along Salt Cre and tributaries, of which 17 were major, 30 we moderate and 49 were minor. Two inflict catastrophic damages. The highest peak dischar was 30,650 cubic ft/sec in a 1908 event. A 19 flood had a peak of 28,200 cfs and caused damag of $1.6 million in Lincoln. No predictions of pe discharges for future large floods is contained this report, but flood plains are delineated on ma for the 25-year and 100-year flood. Guidelines a given for floodplain management. At the time this report, 5 storage structures on upstream trib taries of Salt Creek and one on a Haines Bran tributary had been authorized. For detailed flo plain and technical information consult the m report. (Smith-North Carolina)
W77-03179

FLOOD PLAIN INFORMATIO METROPOLITAN REGION, LINCOL NEBRASKA, VOLUME II, SUMMARY R PORT, ANTELOPE CREEK, DEAD MANS RU AND MIDDLE CREEK, SALT CREEK BASIN.
Army Engineer District, Omaha, Nebr.
Prepared for Lincoln City-Lancaster Coun Planning Commission, April 1966. 10 p, 5 fig, plates.

Descriptors: *Nebraska, *Floods, *Flood profil *Flood plains, *Flood protection, Flood foreca ing, Historic floods, Non-structural alternativ Building codes, Control structures, Water contr Identifiers: *Antelope Creek(NB), Dead Ma Run(NB), *Middle Creek(NB), Lincoln(NB), year flood, 100-year flood, Flood plain zoning.

Antelope Creek and Dead Mans Run are rig bank tributaries of Salt Creek and rise within t Lincoln metropolitan area. They drain 14 and 1 sq mi, respectively. Middle Creek, a left ba tributary of Salt Creek, drains about 100 sq Urban development is concentrated within L coln city limits, while other lands are more ru and devoted to pasture and crops. Lincoln a vicinity are expected to continue to grow, so th staggering losses which have occurred in floo plains in the past may be increased unless flo protection is established. Floods generally occur spring and summer months and are sometimes creased by snowmelt. On rare occasions snowm alone may cause flooding. Since 1900, 8 floods the Antelope Creek basin have been recorded a heavy damages have occurred. No floods ha been recorded on Middle Creek and two floo have occurred on Dead Mans Run. A 1951 flood Antelope Creek caused damages estimated

U. of I. URBANA-CHAMPAIGN

2,000. This report does not predict peak charges of possible future large floods, but information on 25-year floods and 100-year floods is en in the form of flood plain delineation maps. ıor flood protection has been given by conction of 3 storage structures, one on Antelope ek near Van Dorn Street, two on the upstream ches of Middle Creek. At each of the stream's fluences with Salt Creek, a protective works to rd against backwater effects of Salt Creek is posed. Guidelines for floodplain management given. (Smith-North Carolina)
7-03180

)OD PLAIN INFORMATION: TROPOLITAN REGION, LINCOLN, BRASKA, VOLUME III, SUMMARY RE-RT, LITTLE SALT, OAK, SALT, AND EVENS CREEK, SALT CREEK BASIN.
ıy Engineer District, Omaha, Nebr.
ɔared for Lincoln City-Lancaster County ıning Commission, September 1967. 12 p, 7 fig, lates.

criptors: *Nebraska, *Floods, *Flood profiles, ɔod plains, Historic floods, Peak discharge, ɔd protection, Non-structural alternatives, trol structures, Dams, Channel improvement. ıtifiers: *Little Salt Creek(NB), *Oak ek(NB), *Salt Creek(NB), *Stevens ek(NB), Lincoln(NB), 25-year flood, 100-year d.

le Salt and Oak Creeks are left bank tributaries alt Creek and drain 47 and 272 sq mi, respecly. Stevens Creek, a right bank tributary, ns 55 sq mi and enters Salt Creek just nstream of Lincoln. Except for the ropolitan reach of Oak Creek and several rural munities, the basins of the tributary streams ıis report are undeveloped. Salt Creek, which ns 1,627 sq mi has, in contrast, major develop-t along it within the city limits of Lincoln. ough Lincoln is predicted to continue its vth, little expansion is expected in the reaches hese streams. Floods occur most often in ng and summer months, when rain is heavy or ombined with snowmelt. On rare occasions vmelt alone can cause flooding. Only two or floods have occurred on Oak Creek, in 1945 1947 and damage was relatively small. Since , 17 major and 83 minor floods have been rded on Salt Creek and major damage has caused. In a 1951 flood a peak discharge of 00 cubic ft/sec was recorded. Peak discharges ɔossible future large events are not given, but d plain delineation maps which show the ex-of 25-year and 100-year floods are included. e channel improvement has taken place on and Salt Creeks, but protection is small. A ɔs of Engineers project which includes dams other possible improvements would aid in d protection. Guidelines for floodplain agement are given. (Smith-North Carolina)
-03181

OD PLAIN INFORMATION: WILDCAT EK AND KOKOMO CREEK, VICINITY OF KOMO, HOWARD COUNTY, INDIANA.
y Engineer District, Louisville, Ky.
ared for the City Planning Commission of ɔmo and Howard County Planning Commis-July 1972. 42 p, 17 fig, 11 plates, 11 tab.

riptors: *Floods, *Flooding, *Flood forecast-*Flood data, *Flood protection, *Non-struc-alternatives, *Flood plain zoning, *Levees, iana, Runoff, Flood flow, Historic floods, d stages, Peak discharge, Flow duration, characteristics, Flood damage, Flood plains, ructions to flow, Flood profiles, Flash floods. tifiers: *Wildcat Creek(IN), *Kokomo k(IN), Kokomo(IN), Howard County(IN), dard Project Flood, Intermediate Regional d.

This report covers 12.2 miles of Wildcat Creek, from mile 58 to the dam at the Kokomo Waterworks Reservoir at mile 70.2, and Kokomo Creek, from its mouth to the gaging station at mile 4.42. Varying in width from 200 to 500 feet, the flood plains have industrial, commercial and residential developments in and near Kokomo. Within the study reach, the stream beds fall at an average of 7.3 feet per mile. Main flood season occurs in winter and early spring resulting from heavy rains; however, summer thunderstorms can create flooding conditions also. In the open channels, water velocities range up to 13.8 ft/sec and floods have a relatively short duration and fast rate of rise. Flood damage prevention measures include structural levees, flood plain zoning, subdivision regulations and flood warning and forecasting services. Natural obstructions as well as 46 bridges, 4 dams, and levees impede flood flows. Although the greatest known flood occurred in March 1913, the largest recorded flood was in April 1964 with an elevation of 817.6 feet (gage zero is 755.62 feet). Similar levels of flooding occurred on Wildcat Creek. An Intermediate Regional Flood and Standard Project Flood on Kokomo Creek are estimated to crest at 818.9 ft and 829 ft, and have peak discharges of 2,300 cubic feet per second and 6,500 dfs respectively. On Wildcat Creek the IRF and SPF would peak at 16,200 cfs and 4,500 cfs respectively. (Salzman-North Carolina)
W77-03182

FLOOD PLAIN INFORMATION: SCIOTO AND OLENTANGY RIVERS, OHIO, COLUMBUS AREA, SUMMARY REPORT.
Army District Engineers, Huntington, W. Va.
Prepared for the State of Ohio Department of Natural Resources. Prepared by Dodson, Kinney and Lindblom, Columbus, October 1966. 23 p, 16 fig, 13 plates, technical append.

Descriptors: *Ohio, *Floods, *Non-structural alternatives, *Control structures, *Flood plains, Flood profiles, Obstructions to flow.
Identifiers: *Scioto River(OH), *Olentangy River(OH), Chillicothe(OH), Columbus(OH), Julian Griggs Reservoir(OH), Paint Creek(OH), North Fork(OH).

This report covers Scioto and Olentangy Rivers in the Columbus OH area and the Scioto River, Paint Creek and its tributary, North Fork, in the Chillicothe OH area. In Columbus, the Scioto's flood plains as well as the narrow flood plains of the Olentangy are extensively developed with residential and commercial properties, bridges and roadways. Outside of the urban area, the flood plains are primarily for agricultural purposes. The greatest flood occurred in March 1913 causing damages to $5.6 million. This could be repeated in the future. Flood control improvements include 4 reservoirs, of which only one has been built, channel improvements, levees and a variety of flood plain regulations. Guidelines for reducing future flood damages are outlined. These measures include: (1) flood control works such as dams and reservoirs, levees, flood walls, channel improvements and watershed treatment; and (2) flood plain management techniques such as channel and floodway encroachment lines, zoning ordinances, subdivision regulations, building codes, floodproofing and warning systems. This report serves as a guide for adoption of suitable flood plain regulations and management techniques. (Salzman-North Carolina)
W77-03183

JOINT PROBABILITY METHOD OF TIDE FREQUENCY ANALYSIS APPLIED TO APALACHICOLA BAY AND ST. GEORGE SOUND, FLORIDA,
National Weather Service, Silver Spring, Md. Office of Hydrology.
For primary bibliographic entry see Field 2L.
W77-03304

ALLATOONA LAKE, DESTRATIFICATION EQUIPMENT TEST REPORT.
Army Engineer District, Savannah, Ga.
For primary bibliographic entry see Field 5G.
W77-03306

ALLATOONA LAKE, DESTRATIFICATION EQUIPMENT TEST, APPENDIX A, OPERATIONAL AND WATER QUALITY DATA, 1968.
Army Engineer District, Savannah, Ga.
For primary bibliographic entry see Field 5G.
W77-03307

ALLATOONA LAKE, DESTRATIFICATION EQUIPMENT TEST, APPENDIX B, OPERATIONAL AND WATER QUALITY DATA, 1969.
Army Engineer District, Savannah, Ga.
For primary bibliographic entry see Field 5G.
W77-03308

ALLATOONA LAKE, DESTRATIFICATION EQUIPMENT TEST, APPENDIX C, OPERATIONAL AND WATER QUALITY DATA, 1970.
Army Engineer District, Savannah, Ga.
For primary bibliographic entry see Field 5G.
W77-03309

ALLATOONA LAKE, DESTRATIFICATION EQUIPMENT TEST, APPENDIX D, EFFECTS OF ARTIFICIAL DESTRATIFICATION ON TEMPERATURE AND DISSOLVED OXYGEN IN ALLATOONA RESERVOIR.
Associated Water and Air Resources Engineers, Inc., Nashville, Tenn.
For primary bibliographic entry see Field 5G.
W77-03310

HYDROLOGY AND ENVIRONMENTAL ASPECTS OF ERIE CANAL (1817-99),
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 8B.
W77-03334

FLOODFLOW CHARACTERISTICS AT PROPOSED BRIDGE SITE ABOVE SHERWOOD ROAD ON WEST BRANCH DELAWARE RIVER, DELHI, NEW YORK,
Geological Survey, Albany, N. Y. Water Resources Div.
B. Dunn, and T. J. Zembrzuski, Jr.
Open-file report 76-778, November 1976. 10 p, 3 fig, 4 tab, 6 ref.

Descriptors: *Flood flow, *Flood frequency, *Flood recurrence interval, *Bridge design, Streamflow, Hydraulic properties, Flow characteristics, Flow resistance, Flood forecasting, *New York.
Identifiers: *West Branch Delaware River(NY), *50-year flood, *100-year flood.

An evaluation of floodflow characteristics for a 50- and 100-year flood was made for a proposed bridge site across West Branch Delaware River in Delaware County, N.Y. Several design conditions were analyzed for their effect on the 100-year profile. Analyses were made to determine the effect of both removal and retention of the existing Sherwood Road bridge and roadway embankment 750 feet downstream from the proposed site. The normal water-surface elevation (without the bridge) at the proposed site would be 1,345.2 feet for the 50-year flood and 1,345.6 feet for the 100-year flood if the existing Sherwood Road bridge and embankment were retained, and would be 1,344.8 feet and 1,345.1 feet for the 50- and 100-year flood, respectively, if the bridge and roadway embankment were removed. The magnitudes of the 50- and 100-year floods at the proposed site would be 8,300 cubic feet per second and 9,300 cubic feet per second, respectively. (Woodard-USGS)

W77-03337

NATIONAL PROGRAM FOR MANAGING FLOOD LOSSES: GUIDELINES FOR PREPARATION, TRANSMITTAL, AND DISTRIBUTION OF FLOOD-PRONE AREA MAPS AND PAMPHLETS,
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-03341

CHEMICAL AND BACTERIOLOGICAL QUALITY OF WATER AT SELECTED SITES IN THE SAN ANTONIO AREA, TEXAS, AUGUST 1968 - JANUARY 1975,
Geological Survey, Austin, Tex. Water Resources Div.
For primary bibliographic entry see Field 5A.
W77-03343

DEPTH AND FREQUENCY OF FLOODS IN ILLINOIS,
Geological Survey, Champaign, Ill. Water Resources Div.
For primary bibliographic entry see Field 2E.
W77-03346

PROBABLE MAXIMUM FLOOD AT LAKE CHIPPEWA NEAR WINTER, WISCONSIN,
Geological Survey, Madison, Wis. Water Resources Div.
W. R. Krug.
Open-file report 76-800, November 1976. 14 p, 7 fig, 3 tab, 6 ref.

Descriptors: *Maximum probable flood, *Lakes, Dams, *Simulation analysis, *Reservoir operation, Streamflow, Inflow, *Wisconsin.
Identifiers: *Lake Chippewa(Wisc).

The probable maximum flood was computed for Lake Chippewa, Wisconsin, and routed through the lake to determine maximum lake stage. The peak discharge of the probable maximum flood at Lake Chippewa was computed to be about 75,000 cubic feet per second, primarily caused by rainfall on the lake. A secondary peak of about 41,000 cubic feet per second was due to streamflow entering Lake Chippewa. The 14-day volume of this flood was 450,000 acre-feet. Using an assumed operating procedure for Winter Dam, the maximum lake stage for the probable maximum flood was computed to be about 1,318 feet above mean sea level--about 3 feet below the dam crest and 6 feet above the proposed normal summer operating level. The probability of this flood occurring in any year is less than 1 in 10,000. (Woodard-USGS)
W77-03349

PROJECTIONS OF POPULATION, EMPLOYMENT, INCOME AND WATER USE FOR IOWA RIVER BASINS, 1975-2020,
Iowa Univ., Iowa City. Inst. of Economic Research.
For primary bibliographic entry see Field 6D.
W77-03542

THE OBJECTIVES, PART I OF THE STATE WATER PLAN, (IDAHO WATER RESOURCES BOARD).
Idaho Water Resource Board, Boise.
For primary bibliographic entry see Field 6B.
W77-03544

WATER FOR NEVADA. WATER PLANNING REPORT.
Nevada Div. of Water Resources, Carson City. Office of State Engineer..
For primary bibliographic entry see Field 6B.
W77-03545

FEASIBILITY OF TRANSPLANTATION, REVEGETATION, AND RESTORATION OF EELGRASS IN SAN DIEGO BAY, CALIFORNIA,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Environmental Effects Lab.
For primary bibliographic entry see Field 5G.
W77-03546

IOWA'S WATER RESOURCES PROGRAM PROGRESS AND NEEDS.
Iowa Natural Resources Council, Des Moines.
For primary bibliographic entry see Field 6B.
W77-03547

PLAN FOR IMPROVEMENT OF THE DELTA LEVEES.
California State Dept. of Water Resources, Sacramento.
Bulletin No. 192, May 1975. 28 p, 7 fig, 3 tab.

Descriptors: *Flood control, *Levees, *Deltas, *California, Multiple-purpose projects, Recreation facilities, Shore protection, Cost-benefit analysis, Estimated costs, Capital costs, Annual costs, Estimated benefits, Financing, Design.
Identifiers: *Sacramento-San Joaquin Delta(Calif).

A plan to solve some of the Sacramento-San Joaquin Delta flood control, levee maintenance, shortage of public access and recreation facilities, and lack of adequate land use control problems is proposed. A total of 310 miles of levees that surround portions of 55 islands or tracts would be improved, 45 miles to a 100-year flood level and 265 miles to provide 50-year protection. The latter would only be adequate for agricultural land use. The plan also provides for 50 recreation access sites, 40 of which would be for fishing access, improved roads, and enhancement of the environment. The preliminary capital cost is estimated to be $128 million to be shared by federal, state and local sources on a 50%, 30%, 20% basis respectively. About 90% of this total cost involves flood control measures. Annual operation, maintenance, and replacement costs of approximately $1.1 million would be funded by local and state groups. The project is expected to be completed over a 20-year period. An economic analysis of the project indicates that approximately $7 million of primary direct annual benefits would accrue from the project compared to an estimated total equivalent annual cost of $5.5 million. In addition, large secondary monetary benefits and social and environmental benefits are anticipated. (Luedtke-Wisconsin)
W77-03550

THE CALIFORNIA STATE WATER PROJECT IN 1975.
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 6B.
W77-03551

HYDROLOGIC INVENTORY OF THE SAN RAFAEL STUDY UNIT.
Utah Div. of Water Resources, Salt Lake City.
January 1976. 93 p, 34 fig, 17 tab.

Descriptors: *Watershed management, *Hydrologic budget, *Water management(Applied), *Utah, *River basins, Planning, Water resources development, Impoundments, Reservoirs, Hydrologic cycle, Water balance, River basin development, Optimum development plans, Tributaries.
Identifiers: *San Rafael River(Utah).

As part of Utah's state water plan, the water resources of the San Rafael River basin are categorically reported, including historical elements, climatological factors, the water budget, water quality parameters and water manage aspects. The report culminates an effort to d mine the normal amount of water yielded i basin, its location, present uses, water quality potential developmental uses. Historical records show an average surplus of 80,000 feet of storable, good quality water in the b However, impoundments on the major tribut to insure agricultural water supplies mean large water development programs are only p ble on the San Rafael River proper, where en return flows augment spring runoff and sur thundershowers to provide adequate quantiti water. But estimation and planning for the u this return flow will be feasible only when st and release data are provided for the new trib reservoirs. Water quality studies are needed most probable main stem dam site to deter sediment deposition rates and dissolved ion centrations relative to long term upstream g Further studies are needed of arable lands a coal-fired electric power generation locat Sprinkler application and canal lining will pro be intermediate steps between present flood i tion and downstream development. (H Wisconsin)
W77-03552

THE STATE OF UTAH WATER - 1975,
Utah Div. of Water Resources, Salt Lake City
For primary bibliographic entry see Field 6B.
W77-03559

THE STATE OF UTAH WATER.
Utah Div. of Water Resources, Salt Lake City
For primary bibliographic entry see Field 6D.
W77-03560

IOWA WATER RESOURCES FRAMEW STUDY PLAN OF STUDY.
Iowa Natural Resources Council, Des M
Technical Coordinating Committee.
For primary bibliographic entry see Field 6B.
W77-03561

CONDUCTING SEWER SYSTEM EVA TIONS FOR SMALL SYSTEMS,
For primary bibliographic entry see Field 5D.
W77-03581

CALIFORNIA WATER PROJECT: LAW POLITICS,
California Univ., Berkeley. Dept. of Econom
For primary bibliographic entry see Field 6E.
W77-03583

CORPS' NEW LOOK IN FLOOD CONT NO DAMS, LEVEES,
M. Zeldin.
Audobon, Vol 77, p 103-04, July 1975. 2 p.

Descriptors: *Nonstructural alterna *Administrative agencies, Civil engine *Floodproofing, *Flood control, Flood da Flood discharge, Flood plain insurance, protection, Flood routing, Relocation, Water control, Water storage, Barriers, Dam struction, Surface drainage, Surface runoff face waters.
Identifiers: *Army Corps of Engineers, * Resources Development Act.

The Army Corps of Engineers has always known for its policy of 'build now, and ther some more later'. This policy is changing und terms of Section 73 of the Water Res Development Act. It requires all federal ag planning flood control projects to give cons tion to nonstructural alternatives to prev reduce flood damages. This includes floodpr of structures, floodplain regulation and a tion, and relocation where necessary. En

ntal groups will now, for the first time, have a nce to work with the Corps of Engineers in nning suitable construction projects and recom-nding alternatives. Examples of the Corps' new milder tactics can be found at Prairie du en, Wisconsin, the Charles River watershed, ssachusetts, and the Chatfield Dam on the th Platte River, not far from Denver, orado. (Frank-Florida)
7-03593

. Groundwater Management

E TRANSPORT OF POLLUTANTS IN OUND WATER, (IN GERMAN),
ifornia Univ., Riverside. Dept. of Soil Science Agricultural Engineering.
primary bibliographic entry see Field 5B.
7-03131

E OCCURRENCE OF GROUNDWATER IN E SATPURA REGION OF CENTRAL INDIA,
zona Univ., Tucson. Dept. of Hydrology and ter Resources.
V. Uhl.
ster of Science Thesis, 1976. 135 p., 42 fig, 21 26 ref.

scriptors: *Groundwater, *Water supply, *Well a, *Groundwater availability, *Groundwater ing, Crystalline rocks, Basalts, Sandstones, les, Geology, Alluvium, Wells, Water sources, ifers, Pumping, Recharge, Discharge(Water), ter types, Subsurface waters, Dug wells, Water ls, *Arizona.
ntifiers: Satpura region(Ariz).

drilling of 500 tube wells in the Satpura region Central India is described. The geology of the a, the history of water development there, and impact of improved water services are cussed. Geologically, the area is underlain by stalline rocks, basalts and sandstones. Ground-er flow systems are of the local and inter-liate type. Well data are analyzed, and the ilts presented. Wells drilled in valleys and flat ands were the most productive and average l yields in crystalline rocks were greater than se in basalts or sandstones. Topographic loca-and fracturing were considered to be the dominant factors affecting well yields in the stalline rocks. Well yield and specific capacity ilts were compared to results from areas of ilar geology. (Jamail-Arizona)
7-03146

DROGEOLOGY OF THE MISSOURI RIVER OOD PLAIN NEAR GLASGOW, MISSOURI,
souri Univ., Columbia. Dept. of Geology.
primary bibliographic entry see Field 2F.
7-03164

COMPUTER PROGRAM FOR ESTIMATING STS OF OWNING AND OPERATING AN IR-GATION WELL UNDER CONDITIONS OF CLINING WATER LEVELS,
shington State Univ., Pullman. Dept. of icultural Economics.
primary bibliographic entry see Field 6C.
7-03211

RMAL-MODE ANALYSIS OF THE STRUC-RE OF BASEFLOW RECESSION CURVES,
artment of the Environment, Reading gland). Central Water Planning Unit.
primary bibliographic entry see Field 2F.
7-03313

W FLOW MODELING IN SMALL STEEP TERSHEDS,
h Water Research Lab., Logan.
primary bibliographic entry see Field 4D.
W77-03316

MEASURED AND SIMULATED GROUND-WATER LEVELS IN THE FRANKLIN AREA, SOUTHEASTERN VIRGINIA,
Geological Survey, Albany, N. Y. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-03326

MAPS SHOWING GROUND-WATER CONDITIONS IN THE SAN SIMON AREA, COCHISE AND GRAHAM COUNTIES, ARIZONA, AND IN HIDALGO COUNTY, NEW MEXICO--1975,
Geological Survey, Tucson, Ariz. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-03327

MAPS SHOWING GROUND-WATER CONDITIONS IN THE SAN BERNARDINO VALLEY AREA COCHISE COUNTY, ARIZONA--1975,
Geological Survey, Tucson, Ariz. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-03328

GROUND-WATER LEVELS IN NEW MEXICO, 1975,
Geological Survey, Albuquerque, N. Mex. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-03330

HYDRAULIC CHARACTERISTICS OF THE PINEY POINT AQUIFER AND OVERLYING CONFINING BED NEAR DOVER, DELAWARE,
Geological Survey, Parkville, Md. Water Resources Div.
For primary bibliographic entry see Field 2F.
W77-03331

GROUND-WATER QUALITY DATA FOR GEORGIA,
Geological Survey, Doraville, Ga. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-03333

BURIED AQUIFERS IN THE BROOTEN-BELGRADE AND LAKE EMILY AREAS, WEST-CENTRAL MINNESOTA--FACTORS RELATED TO DEVELOPING WATER FOR IRRIGATION,
Geological Survey, St. Paul, Minn. Water Resources Div.
R. J. Wolf.
Water-Resources Investigations 76-100, September 1976. 72 p, 18 fig, 7 plates, 3 tab, 16 ref.

Descriptors: *Groundwater resources, *Irrigation wells, *Water yield, *Aquifer characteristics, *Water quality, *Minnesota, Hydrogeology, Well data, Test wells, Water pollution sources.
Identifiers: West-Central Minnesota, Brooten-Belgrade area(Minn), Lake Emily area(Minn).

Irrigation has given a substantial boost to the economy in the Brooten-Belgrade and Lake Emily areas of Minnesota. The surficial outwash aquifer is capable of yielding sufficient quantities of water for irrigation over half of its area; the remaining part may be supplied by deep aquifers. Buried glacial outwash and Cretaceous sand aquifers, as thick as 50 feet occur to depths of 300 feet. In places, the buried aquifers are sufficiently thick and permeable to yield large quantities of water to wells. The buried aquifers are probably narrow, elongate, truncated bodies enclosed by clay till. The Precambrian surface, ranging from 190 to 350 feet below the land surface, is the lower limit of the buried aquifers. Water in the buried-drift aquifers is a very hard calcium magnesium bicarbonate type, suitable for irrigation needs. Water in Cretaceous aquifers, although untested, is expected to be higher in dissolved solids. Potenial water problems include slow rate of recharge to buried aquifers, and head loss caused by screening of the surficial and buried aquifers in the same well, and by allowing well to flow unabated. Another potential problem is possible pollution of the buried aquifers through the boreholes of multiaquifer wells. (Woodard-USGS)
W77-03335

APPRAISAL OF WATER RESOURCES IN THE HACKENSACK RIVER BASIN, NEW JERSEY,
Geological Survey, Trenton, N. J. Water Resources Div.
For primary bibliographic entry see Field 2F.
W77-03336

PLAN OF STUDY OF THE HYDROLOGY OF THE MADISON LIMESTONE AND ASSOCIATED ROCKS IN PARTS OF MONTANA, NEBRASKA, NORTH DAKOTA, SOUTH DAKOTA, AND WYOMING.
Geological Survey, Denver, Colo.
Open-file report 75-631, December 1975. 35 p, 5 fig, 2 tab, 43 ref.

Descriptors: *Groundwater resources, *Coal mines, *Montana, *Nebraska, *North Dakota, Water demand, Planning, Available water, Hydrogeology, Aquifers, Aquifer characteristics, Limestones, Rocks.
Identifiers: *Madison limestone.

A major part of the United States' coal reserves is in the Fort Union coal region of the Northern Great Plains. Large-scale development of these reserves would place a heavy demand on the area's limited water resources. Surface water is poorly distributed in time and space. Its use for coal development in parts of the area would require storage reservoirs and distribution systems, whereas in the rest of the area surface water is fully appropriated and its use would deprive present users of their supply. Preliminary studies by the U.S. Geological Survey and State agencies in Wyoming, Montana, and South Dakota indicate that the Madison Limestone and associated rocks might provide a significant percentage of the total water requirements for coal development. This report briefly summarized the present knowledge of the geohydrology of the Madison and associated rocks, identifies the need for additional data, and outlines a 5-year plan for a comprehensive study of the hydrology of these rocks. (Woodard-USGS)
W77-03338

HYDROLOGIC STUDIES BY THE U.S. GEOLOGICAL SURVEY IN OIL-SHALE AREAS OF COLORADO, UTAH, AND WYOMING, 1976.
Geological Survey, Denver, Colo.
Open-file report, February 1976. 88 p, 13 fig, 12 tab, 14 ref.

Descriptors: *Water resources, *Water quality, *Oil shales, *Mine wastes, Surface waters, Groundwater, Data collections, *Colorado, *Utah, *Wyoming, Streamflow, Flow rates, Gaging stations, Reservoirs, Soil moisture, Groundwater movement, Water wells, Chemical analysis, Sediment transport, Path of pollutants, Hydrologic data.

The U.S. Geological Survey has for many years maintained a program of water-resources investigations that includes the oil-shale areas of Colorado, Utah, and Wyoming. The recent interest in oil shale has added new dimensions and greater intensity to the investigations. This report describes the water-resources investigation pro-

gram that is currently in operation. Locations of gaging stations and water-quality measuring sites, frequencies and parameters, and areas of groundwater studies are included. Brief descriptions of studies by investigators who are headquartered outside the Geological Survey's district operations also are included. These studies are research related to oil shale, chemical exchanges in waste material, extraction, water quality, and post-mining reclamation. (Woodard-USGS)
W77-03340

CHEMICAL COMPOSITION DATA AND CALCULATED AQUIFER TEMPERATURE FOR SELECTED WELLS AND SPRINGS OF HONEY LAKE VALLEY, CALIFORNIA.
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 2K.
W77-03342

CHEMICAL AND BACTERIOLOGICAL QUALITY OF WATER AT SELECTED SITES IN THE SAN ANTONIO AREA, TEXAS, AUGUST 1968 - JANUARY 1975,
Geological Survey, Austin, Tex. Water Resources Div.
For primary bibliographic entry see Field 5A.
W77-03343

HIGH-RESOLUTION SEISMIC REFLECTION PROFILING FOR MAPPING SHALLOW AQUIFERS IN LEE COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla. Water Resources Div.
For primary bibliographic entry see Field 7B.
W77-03344

SUMMARY OF GEOLOGY AND GROUNDWATER RESOURCES OF PASSAIC COUNTY, NEW JERSEY,
Geological Survey, Trenton, N.J. Water Resources Div.
L. D. Carswell, and J. G. Rooney.
Water-Resources Investigations 76-75, June 1976. 47 p, 7 fig, 1 plate, 3 tab, 25 ref.

Descriptors: *Groundwater resources, *Aquifer characteristics, *Well data, *Water yield, *Water quality, *New Jersey, Hydrogeology, Geologic mapping, Water utilization, Groundwater recharge.
Identifiers: Passaic County(NJ).

The Brunswick Formation of Triassic age is the most important aquifer in the southeastern one-third of Passaic County, N. J. Yields of public supply and industrial wells range from 50 to 510 gal/min and the median yield is 130 gal/min. Most of these wells are 200 to 400 feet deep. The median yield of all public supply and industrial wells over 300 feet deep and 8 inches or larger in diameter is 230 gal/min. Crystalline rocks of Precambrian age are the major source of ground water for domestic use in the northwestern two-thirds of Passaic County. Well yields range from 1 to 200 gal/min. The median yield of domestic wells is 5 gal/min and that of public supply wells is 30 gal/min. Unconsolidated stratified deposits of Quaternary age are potentially an important source of ground water for future development. Yields of wells tapping the stratified deposits range from 4 to 920 gal/min. The median reported yield of domestic wells is 16 gal/min and that of public supply and industrial wells is 130 gal/min. The quality of ground water in Passaic County varies from one aquifer to another. Water from the Precambrian rocks is soft to moderately hard (34 to 104 mg/liter) and is low in dissolved solids (66 to 159 mg/liter). Water from the Brunswick Formation is moderately hard to very hard (89 to 540 mg/liter). The dissolved solids content ranges from 129 to 563 mg/liter. Groundwater pumpage by the major public supply companies in the county has increased from 2.1 million gallons per day in 1951 to 4.39 million gallons per day in 1968. (Woodard-USGS)
W77-03345

GROUND-WATER RESOURCES OF GREELEY AND WICHITA COUNTIES, WESTERN KANSAS,
Geological Survey, Lawrence, Kans. Water Resources Div.; and Geological Survey, Lawrence, Kans.
S. E. Slagle, and E. C. Weakly.
Kansas Geological Survey, Lawrence, Irrigation Series No 2, June 1976. 21 p, 10 fig, 3 plates, 3 tab, 41 ref, append.

Descriptors: *Groundwater resources, *Aquifer characteristics, *Water wells, *Water yield, *Water quality, Water utilization, Irrigation wells, Pumping, Water level fluctuations, Groundwater recharge, Available water, *Kansas.
Identifiers: Greeley and Wichita Counties(Kans), Groundwater storage.

Unconsolidated deposits of sand, silt, clay, and gravel compose the principal aquifer in Greeley and Wichita Counties, Kans. The deposits are as much as 300 feet thick, of which as much as 145 feet is saturated. In 1972, there were about 1,040 large-capacity wells-yielding 100 gallons per minute or more--in the counties, mostly for irrigation supplies. The wells yield as much as 2,000 gallons per minute. Withdrawals of ground water average about 220,000 acre-feet annually. Water levels have declined in parts of the area where large-capacity wells are concentrated, resulting in as much as 60-percent reduction in saturated thickness. Water-level declines during 1948-72 ranged from less than 10 to about 55 feet. The largest decline, about 55 feet, has occurred near Leoti, in central Wichita County. As of January 1972, about 5 million acre-feet of ground water were in storage in Greeley and Wichita Counties; however, only about 70 percent of this amount is considered to be available for pumping. The water from the unconsolidated aquifer is a mixed chemical type in which calcium, sodium, and bicarbonate are the principal constituents. Generally, the water is suitable for all common domestic, stock, an irrigation uses. (Woodard-USGS)
W77-03347

SELECTED DATA ON WATER WELLS, GEOTHERMAL WELLS, AND OIL TESTS IN IMPERIAL VALLEY, CALIFORNIA,
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-03348

GROUNDWATER QUALITY ADJACENT TO A SEPTIC TANK SYSTEM,
ADI, Ltd., Fredericton (New Brunswick).
For primary bibliographic entry see Field 5D.
W77-03456

WATER MANAGEMENT AND REGULATION OF WATER USE,
Central and Southern Florida Flood Control District, West Palm Beach.
For primary bibliographic entry see Field 6B.
W77-03525

SIGNIFICANCE OF NITRATES IN DRINKING WATER, (IN RUSSIAN),
Belorussian Sanitary-Hygienic Research Inst., Minsk (USSR).
For primary bibliographic entry see Field 5B.
W77-03541

CALIFORNIA'S GROUND WATER.
California State Dept. of Water Resources, Sacramento. Div. of Planning.
Bulletin No. 118, September 1975. 145 p. 33 fig., tab.

Descriptors: *Groundwater basins, *California Surveys, Water supply, Water resources development, Groundwater, Water utilization, Groundwater recharge, Groundwater resources, Management, Surface-groundwater relationships, Conjunctive use.
Identifiers: Groundwater law.

Technical information on groundwater basins, th extent of their water supplies, the ways in whic they have been used and misused, and bett management mechanisms for the future a discussed. The usable storage capacity of Califo nia groundwater basins is about 143 million acr feet. About 40% or 15 million acre-feet per year California's applied water needs is obtained fro them, and there is an overdraft of 2.2 million acr feet per year. With the exception of dissolved sal problems in some basins, groundwater quality suitable for all beneficial uses. The developme of computers capable of solving many equatio simultaneously has allowed use of mathematic models of the basins' hydrology to evaluate alte native water management plans. It is conclud that: (1) water could be pumped from some basi to support industries such as the thermal electr power industry, which have an economic life sho enough to be supplied by the available water; (groundwater has been the single most importa resource contributing to the present developme of the state's economy and use of basin storag capacity offers the largest potential benefit fro management of the state's resources, (3) so basins with large supplies of inexpensive surfa water require well fields to prevent draina problems due to rising groundwater levels. An i ventory of the groundwater resources, divid into nine hydrologic study areas, is also provide (Luedtke-Wisconsin)
W77-03548

MEETING WATER DEMANDS IN SACRAME TO COUNTY.
California State Dept. of Water Resources, Sacr mento.
For primary bibliographic entry see Field 6D.
W77-03553

GROUND WATER BASIN PROTECTION PR JECTS: FREMONT SALINITY BARRIER.
California State Dept. of Water Resources, Sacr mento.
Bulletin No. 147-2, June 1975. 12 fig, 4 tab.

Descriptors: *Aquifer management, *Saline wat barriers, *Groundwater recharge, Saline wat Saline water intrusion, Saline-freshwater int faces, Seepage, Subsurface waters, Estuari California, Groundwater barriers, Groundwat movement, Aquifers, Reservoirs, Water polluti sources, Subsurface waters, Water resourc development, Encroachment, Design, Estimat costs, Wells, Environmental effects, Well casing
Identifiers: San Francisco Bay, Alameda Co ty(Calif).

A salt water-intruded ground water reservoir in t Fremont area of southern Alameda Coun California can be restored and maintained as a us ble resource only if three simultaneous actions a taken, according to a water basin protection stud (1) planned recharge of natural and import waters; (2) removal from the ground water res voir of salt water remaining from earlier int sions; and (3) installation of a barrier to preve additional salt water from entering the reservo Description is given of current efforts to rechar aquifers in the Fremont ground water area throu utilization of spreading basins along Alame Creek, along with present and proposed work remove entrapped salt water by means of aquif reclamation wells and pumping into flood cont and drainage canals. The proposed undergrou

water intrusion barrier would be installed
een San Francisco Bay and the aquifers,
ing an irregular line along the landward edge
ne saltwater evaporation ponds west of Fre-
t and extending about nine miles. Estimated
of the six-year project would be slightly more
$3 million. A pumping type of barrier is
mmended, to avoid trapping saline water in
iously-unaffected areas or forcing already-in-
ed saline waters further inland, and to ac-
ate removal of entrapped saline water from
quifer. (Harris-Wisconsin)
-03555

IMPACT OF INTENSIVE APPLICATION
PESTICIDES AND FERTILIZERS ON UN-
GROUND WATER RECHARGE AREAS
CH MAY CONTRIBUTE TO DRINKING
ER PROBLEMS,
ronmental Protection Agency, Washington,
Office of Toxic Substances.
primary bibliographic entry see Field 5B.
-03567

Effects On Water Of Man's Non-Water Activities

ATION BETWEEN ATMOSPHERIC POL-
ION, PRECIPITATION, AND STREAM-
ER QUALITY NEAR A LARGE URBAN-IN-
TRIAL COMPLEX,
is State Water Survey, Urbana.
primary bibliographic entry see Field 5B.
-03097

IRONMENTAL IMPACT OF LAND USE ON
ER QUALITY, PROGRESS REPORT,
County Soil and Water Conservation Dis-
Fort Wayne, Ind.
primary bibliographic entry see Field 5G.
-03106

LTIPLE USE IN THE SOUTHERN
STAL PLAINS IN THE UNITED STATES,
gia Univ., Athens. School of Forest
urces.
May, J. L. Buckner, and S. J. Ursic.
gia Forest Research Council Report No. 35,
1976, 23 p, 26 ref.

riptors: Water resources, *Multiple use,
est management, *Recreation, *Wildlife,
stal plains, *Southeast US, Lumbering,
agement, Water quality, Water supply, En-
ment.
tifiers: Southern Coastal Plains(US),
ltiple use management.

timber-producing industry in the South is
onding to the demand for multiple-use
gement by developing silvicultural practices
vor not only the major commodity, which is
r, but to favor other uses as well. Protection
ater quality is emerging as the second most
rtant factor in the multiple-use management
oastal Plain forests--second only to wood
uction. Forest managers are adopting silvicul-
practices to increase wildlife and recreation
rtunities on their lands, and are studying the
ct of silvicultural practices such as intensive
gement on water quality and supply and
environmental factors. (Forest Service)
03173

STAL MORPHOLOGY AND SEDIMENTA-
, GULF COAST OF ALASKA (GLACIAL
MENTATION),
le Island Univ., Kingston, Dept. of Geology.
rimary bibliographic entry see Field 5B.
03244

SCOUR AROUND BRIDGE PIERS,
West Virginia Univ., Morgantown. Engineering Experiment Station.
For primary bibliographic entry see Field 8B.
W77-03294

THE RESPONSE OF NATURAL CHANNELS TO URBANIZATION: TWO CASE STUDIES FROM SOUTHEAST ENGLAND,
University Coll., London (England). Dept. of Geography.
G. E. Hollis, and J. K. Luckett.
Journal of Hydrology, Vol. 30, No. 4, p 351-363, 1976. 3 fig, 2 tab, 19 ref.

Descriptors: *Urban hydrology, *Urbanization, *Open channels, *Channel morphology, *Cross-sections, Hydraulics, Natural streams, Urban sociology, Foreign countries, Foreign research, On-site investigations.
Identifiers: *Urban channels, *England, *Channel enlargement.

The hypothesis that natural channels become enlarged as a result of an increase in flood flows following urbanization was tested in two areas of southeast England. The first study involved the use of a regression equation in urban basins to predict channel size prior to urbanization. The second study compared measurements made on the same channels in 1956 and 1970, a period during which the basin went from rural to 18% paved. Both studies showed increases in channel size, but this could not be confirmed by a difference of means test suited to paired observations. (Terstriep-ISWS)
W77-03314

THE IMPACT OF A FOREST FIRE ON A WILDERNESS LAKE IN NORTHEASTERN MINNESOTA,
Minnesota Univ., Minneapolis. Limnological Research Center.
For primary bibliographic entry see Field 5B.
W77-03375

4D. Watershed Protection

OPTRM - A HYDROLOGIC TRANSPORT MODEL WITH PARAMETER OPTIMIZATION,
Oak Ridge National Lab. Tenn.
For primary bibliographic entry see Field 5B.
W77-03115

THE UNIT HYDROGRAPH: A SATISFACTORY MODEL OF WATERSHED RESPONSE,
Massey Univ., Palmerston North (New Zealand). Dept. of Geography.
R. G. Heerdegen.
Water Resources Bulletin, Vol 10, No 6, Dec. 1974, p 1143-1161. 6 tab, 2 fig, 38 ref. OWRT B-041-PA(6), 14-31-0001-3635.

Descriptors: *Pennsylvania, *Unit hydrographs, *Precipitation(Atmospheric), Watersheds(Basins), Seasonal, Floods, *Model studies, *Lent squares method.
Identifiers: *Watershed parameters, *Climatic effects, *Flood events, Storm variables, Hydrologic regions, Seasonal differences.

Some 96 flood events larger than the mean annual flood from 16 watersheds in the Commonwealth of Pennsylvania were used to derive unit hydrographs by the least-squares method. Analyses of the unit hydrographs were conducted to ascertain their response to watershed parameters, climatic and storm variables and locations within different hydrologic regions. Significant differences both within and among watersheds led to the formulation and testing of hypotheses stating that differences among watersheds are caused by physiographic differences while differences within watersheds result from climatic and storm differences. The analysis showed, that while many watersheds parameters strongly influence the shape of the unit hydrograph, only the storm variables duration and volume of precipitation excess produce significant differences. Seasonal differences were apparent but not proven statistically significant. (Sink-Penn State)
W77-03126

AFFORESTATION IN LOW RAINFALL AREAS,
Department of Forestry, Pretoria (South Africa).
P. J. Le Roux.
South African Forestry Journal, No. 93, p 1-6, June, 1975. 11 fig, 1 ref.

Descriptors: *Reforestation, *Forest management, *Erosion control, *Forestry, Rainfall, Precipitation(Atmospheric), Erosion, Terracing, Percolation, Forest soils, Forests, Soil moisture, Runoff, Infiltration, Vegetation establishment, Planting management.

Reforestation techniques in arid zones of Spain, Italy, Greece, and Israel were studied, and methods employed in soil preparation, the planting techniques, and the species planted are described. The main objectives of reforestation in Italy, Spain, and Greece are to prevent erosion, establish a green landscape, and form a layer of humus to assist in future reforestation. In low rainfall areas, the eradication of the natural vegetation, which will otherwise compete with the young trees, is considered of vital importance. The reforestation techniques of Israel are discussed separately. Large-scale reforestation has been undertaken in Israel during the past two decades in areas of low rainfall. In these areas, the growth of trees is affected mainly by soil moisture. To achieve the required results, various methods of soil preparation have been devised to improve infiltration of rainwater, to reduce runoff, and to reduce soil moisture losses through evaporation as well as losses due to transpiration of competing vegetation. The aims of the reforestation program in Israel are also presented. (Jamail-Arizona)
W77-03139

COMPUTER PROGRAMS FOR SEDIMENT TRANSPORT, DOCUMENTATION AND LISTING,
Colorado State Univ., Fort Collins. Engineering Research Center.
For primary bibliographic entry see Field 2J.
W77-03298

LOW FLOW MODELING IN SMALL STEEP WATERSHEDS,
Utah Water Research Lab., Logan.
D. S. Bowles, and J. P. Riley.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 102, No. HY9, Proceedings Paper 12405, p 1225-1239, September 1976. 10 fig, 12 ref, 2 append.

Descriptors: *Groundwater, *Low flow, *Washington, Model studies, Computer models, Hydrology, Mathematical models, Mountain forests, Small watersheds, Streamflow, Flow.
Identifiers: *Simulation, *Soil water storage, Systems engineering, Mountain watersheds, Low streamflow.

On some small, steep mountain watersheds, the magnitude of low streamflow is almost uniform for prolonged periods. This phenomenon was exhibited by three small drainage areas within the Entiat Experimental Forest of central Washington State. On these watersheds, about two-thirds of the annual precipitation was in the form of snow. Annual hydrographs for each area were characterized by an almost uniform flow with a complex snowmelt hydrograph superimposed between March and August. The only distinct recession curve occurred at the end of the snowmelt season

and continued to decrease until a relatively uniform streamflow typified by the watershed was reached. In a computer simulation study of the three drainage areas, a linear groundwater reservoir submodel based on the recorded streamflow recession curves was found to be inadequate during low flow periods. Modifications of the subsurface part of the simulation model to improve the representation of the prolonged period of relatively uniform low flows were described in this paper. (Roberts-ISWS)
W77-03316

SILT REMOVAL FROM A LAKE BOTTOM,
Lake Herman Development Association, Inc., Madison, S. Dak.
For primary bibliographic entry see Field 5C.
W77-03392

HYDROLOGIC INVENTORY OF THE SAN RAFAEL STUDY UNIT.
Utah Div. of Water Resources, Salt Lake City.
For primary bibliographic entry see Field 4A.
W77-03552

ENVIRONMENTAL STATUS OF THE LAKE MICHIGAN REGION. VOL. 17. INLAND FISHES OF THE LAKE MICHIGAN DRAINAGE BASIN,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 6G.
W77-03566

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

RELATION BETWEEN ATMOSPHERIC POLLUTION, PRECIPITATION, AND STREAM-WATER QUALITY NEAR A LARGE URBAN-INDUSTRIAL COMPLEX,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 5B.
W77-03097

PRECIPITATION CHEMISTRY STUDIES AT LAKE GEORGE: ACID RAINS,
Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Chemical Engineering and Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Environmetal Engineering.
G. J. Stensland.
Rensselaer Fresh Water Institute at Lake George Newsletter, Vol. 6, No. 1, p 1-3, February 1976. 1 fig, 2 tab.

Descriptors: *Chemistry of precipitation, *Precipitation(Atmospheric), *Acidic water, *New York, Acids, Air pollution, Pollutants, Sampling, Rainfall, Chemistry, Chemical analysis, Hydrogen ion concentration, Sulfates, Winds, Meteorology.
Identifiers: *Lake George(NY).

The mechanisms by which rains have become progressively more acidic over a period of years are not yet well understood. During the summer of 1975, a precipitation chemistry field study was conducted at the Fresh Water Institute facilities at Lake George. The major thrust of the effort was to collect sequential samples for each rain event. The ultimate goal was a clearer understanding of the scavenging processes leading to acid rains. For the 492 samples collected, the highest pH was 6.2, the lowest 3.1; the typical values were in the range of 3.2 to 4.5. The pH and the ion concentrations were extremely variable during single rain events. (Sims-ISWS)
W77-03098

HYGIENIC SUBSTANTIATION OF THE MAXIMUM PERMISSIBLE CONCENTRATION OF TIN TRIBUTYLMETHACRYLATE IN WATER BODIES, (IN RUSSIAN),
Moskovskii Gosudarstvennyi Meditsinskii Institut (I) (USSR).
V. N. Tsai.
Gig Sanit 4, p 42-45, 1975.

Descriptors: *Lethal limit, Public health, *Organic compounds, Toxicity, Rodents, *Pollutant identification, Organic wastes.
Identifiers: *Tin, *Methacrylates.

Tin tributylmethacrylate (TBTM) is highly toxic and has pronounced cumulative properties. Its threshold concentration in rats, judging by its organoleptic index of noxiousness, amounts to 0.064 mg/l, which corresponds to a level of 0.1 mg/l in water bodies. The nontoxic dose of ATTM in a chronic sanitary-toxicologic experiment was 0.00001 mg/kg, which is equivalent to a concentration of 0.0002 mg/l. This concentration is suggested as the maximum permissible one for the substance in water bodies.--Copyright 1976, Biological Abstracts, Inc.
W77-03107

DETERMINATION OF ARSENIC IN DRINKING WATER BY MEANS OF SILVER DIETHYLDITHIOCARBAMATE, (IN RUSSIAN),
Academy of Municipal Economy, Moscow (USSR). Research Inst. of Public Water Supply, Water Purification.
L. A. Khristianova, N. I. Udal'Tsova, and S. S. Soldatova.
Gig Sanit 1, p 70-72, 1975.

Descriptors: *Arsenic compounds, *Potable water, *Pollutant identification, Carbanate pesticides, Public health, Organic compounds
Identifiers: *Arsenic.

For a determination of As in drinking water, As is reduced to arsine and an absorbing solution of silver diethyldithiocarbamate in pyridine is used. The arsine stains the yellow solution of the reagent a violet color, allowing a visual determination of As.--Copyright 1976, Biological Abstracts, Inc.
W77-03113

FIELD MONITORING TECHNIQUES AND DATA ANALYSIS,
North Carolina Univ. at Chapel Hill. Dept. of Environmental Sciences and Engineering.
M. D. Sobsey.
Paper presented at Symposium on Virus Aspects of Applying Municipal Wastes to Land, June 28-29, 1976, Univ. of Florida, Gainesville. 10 p, 2 tab, 21 ref. OWRT A-090-NC(1), 14-34-0001-7070.

Descriptors: *Viruses, *Municipal wastes, *Monitoring, Land use, Soil properties, Vegetation, Statistical methods, Statistics, Geology, Hydrology, Water reuse.
Identifiers: *Land application, *Enteric viruses, Data analysis.

Field monitoring for enteric viruses should be planned and conducted on the basis of a rational virus monitoring program. A variety of site-specific factors, including (1) the type of waste; (2) the nature and extent of preapplication treatment; (3) the type of application system; (4) seasonal, climatic and meteorological conditions; (5) geology, hydrology and soil characteristics; (6) the type of vegetative cover and its intended use; and (7) the population and topology of the area should be considered in assessing the nature and extent of possible virus hazards that could be produced by the operation of the land application system. This assessment can be used to determine the type and size of virus samples and the sampling frequency and thereby provides the basis for the design and operation of a virus monitoring program. The data obtained from the virus monitoring program can be analyzed using conventional statistica techniques but these analytical tools should be ap plied with caution because the conditions required for their use may not be consistent with the pattern of virus distribution and movement through the site, especially over a period of time. (Stewart North Carolina State)
W77-03150

EXPERIMENTAL STUDIES ON THE SECOND INTERMEDIATE HOSTS OF CLONORCHIS SINESIS: III. OBSERVATIONS ON THE RELATIONSHIP BETWEEN CLAVATE CELLS OF EPIDERMIS AND INFECTIVITY OF METACERACARIAE OF CLONORCHIS SINESIS IN FRESHWATER FISH, (IN KOREAN),
For primary bibliographic entry see Field 5C.
W77-03161

THE RELATIONSHIP OF BOTTOM SEDIMENTS TO BACTERIAL WATER QUALITY IN A RECREATIONAL SWIMMING AREA,
Arizona Univ., Tucson. School of Renewable Natural Resources.
For primary bibliographic entry see Field 5B.
W77-03167

MACOMA BALTHICA: AN INDICATOR OF OIL POLLUTION,
Alaska Univ., College. Inst. of Marine Science.
D. G. Shaw, A. J. Paul, L. M. Cheek, and H. M. Feder.
Marine Pollution Bulletin, Vol 7, No 2, February 1976, p 29-31, 2 tab, 4 ref.

Descriptors: *Oil, *Oil pollution, *Oil pollution effects, *Mortalities, *Mullusks, *Benthic organisms, Benthic animals, Oil spill, On-site investigations, Methodology, Bioassay, Sediments, *Alaska, *Bioindicators.
Identifiers: *Macoma balthica, *Bivalve molluscs, Indicator organisms.

The intertidal bivalve mollusc Macoma balthica shows potential as an indicator of oil pollution. In experiments designed to simulate stranding of an oil slick on a mudflat, a significant increase in mortality of this species was found to accompany increasing concentration of petroleum in sediment and increasing duration of exposure. (Katz)
W77-03185

MOLECULAR ACTIVATION ANALYSIS AND ITS APPLICATION TO METHYLMERCURY DETERMINATION IN VARIOUS MARINE SAMPLES,
Carleton Univ., Ottawa (Ontario). Dept. of Chemistry.
I. G. DeJong, and D. R. Wiles.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 6, p. 1324-1330, June, 1976. 4 tab., 17 ref.

Descriptors: *Analytical techniques, *Methodology, *Mercury, *Chemical analysis, *Pollutant identification, Laboratory tests, *Neutron activation analysis, Assay, Heavy metals.
Identifiers: *Nuclear activation analysis, *Methylmercury.

A novel method is described by which nuclear activation analysis can be used to determine the chemical form in which certain elements occur. The radiochemical retention of molecular identity is constant for a given type of sample and can be easily determined. Application of this method for quantitative estimation of methylmercury in fish protein concentrates and in blood is described in detail and the results discussed. The results are reliable and reproducible. Radiochemical retention depends on the species of fish, perhaps because of gamma radiolysis of the sample. An alternative method is also described which, although less

ct, is free from many of the common inter-
nces, such as sodium and phosphorous. This
nod, also useful for blood analysis is ap-
riate for use at remote sampling stations.
z)
-03202

CE HYDROCARBON ANALYSIS IN PREVI-
LY STUDIED MATRICES AND METHODS
ELOPMENT FOR: (A) TRACE
ROCARBON ANALYSIS IN SEA ICE AND
THE SEA ICE-WATER INTERFACE, (B)
LYSIS OF INDIVIDUAL HIGH MOLECU-
WEIGHT AROMATIC HYDROCARBONS,
onal Bureau of Standards, Washington, D. C.
e Organic Analysis Group.
Chesler, B. H. Gump, H. S. Hertz, and W. E.
.
Environmental Assessment of the Alaskan
inental Shelf. Principal Investigators' Reports
he Year Ending March 1976, Vol 9. Chemistry
Microbiology, p 345-378, April 1976. 7 fig, 6
Also as National Bureau of Standards Techni-
lote No. 889.

riptors: *Chemical analysis, *Aromatic com-
ds, Pollutants, *Water quality, Water pollu-
effects, *Baseline studies, *Quality control,
e elements, Organic compounds, Pollutant
ification.
tifiers: *Outer Continental Shelf, Oil explora-
Oil development, Petroleum resources.

increasing petroleum development, serious
ideration must be given to the presence of
polynuclear aromatic hydrocarbons arising
petroleum in the marine environment. In
r to assess the biological effect of these
cules it is first necessary to develop chemical
odology for their analyses at very low levels
g). The liquid chromatographic (LC)
nique described in this report permits ng/kg
analyses. Work is continuing on the develop-
of an analytical method for the determination
troleum hydrocarbons in various marine tis-
samples. A small sediment intercalibration
was initiated. (Sinha-OEIS)
-03219

IRONMENTAL ASSESSMENT OF
SKAN WATERS - TRACE ELEMENT
HODOLOGY - INORGANIC ELEMENTS,
onal Bureau of Standards, Washington, D. C.
Fleur.
Environmental Assessment of the Alaskan
inental Shelf. Principal Investigators' Reports
ie Year Ending March 1976, Vol 9. Chemistry
Microbiology, p 379-442, April 1976. 4 fig, 1
96 ref.

riptors: *Alaska, *Chemical analysis,
roorganisms, *Water quality, Pollutants,
er pollution, *Baseline studies,
ironmental effects, Suspended solids, Bot-
sediments, Data collection, *Trace elements,
nic compounds, Pollutant identification.
ifiers: *Outer Continental Shelf, Oil explora-
Oil development, Petroleum resources.

research reported was designed to determine
ontent of selected trace metals in the water
nn, suspended particulate matter and bottom
ients. The report includes a survey of the
able literature (including an evaluation for
on the concentration and distribution of
ted trace elements). The progress reported is
ed into three main areas: The results of the
ture survey and the evaluation of this survey.
nd, the collection and analyses of samples.
section also includes data obtained on sample
iners and their cleaning. And finally, data on
ossible determination of speciation in ocean
and sediments. (Sinha-OEIS)
03220

BASELINE STUDY OF MICROBIAL ACTIVITY IN THE BEAUFORT SEA AND GULF OF ALASKA AND ANALYSIS OF CRUDE OIL DEGRADATION BY PSYCHROPHILIC BACTERIA,
Oregon State Univ., Corvallis. Dept. of Microbiology.
For primary bibliographic entry see Field 5C.
W77-03223

HISTORICAL AND STATISTICAL OCEANOGRAPHIC DATA ANALYSIS AND SHIP OF OPPORTUNITY PROGRAM,
Alaska Univ., College. Inst. of Marine Science.
R. D. Muench.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 11. Physical Oceanography and Meteorology, p 359-425, April 1976. 41 fig, 2 tab, 16 ref, 2 append. 03-5-022-56.

Descriptors: *Alaska, *Ocean circulation, *Food chains, *Primary productivity, Fisheries, *Oil pollution, *Water pollution effects, *Resources development, *Baseline studies, *Environmental effects, Upwelling.
Identifiers: *Outer Continental Shelf, *Petroleum resources, Oil exploration, Oil development, Oceanographic data, Cyclonic circulation.

Both historical and currently incoming ship-of-opportunity oceanographic data is utilized to examine large-scale circulation and mixing features on the southeastern Bering Sea shelf. Data obtained in the Unimak Pass-Bristol Bay region during summer 1968 were adequate to support existing hypotheses that a cyclonic circulation was occurring in that region. The data suggested in addition that upwelling of deeper water was occurring in central Bristol Bay. The hypothetical cyclonic circulation and attendant upwelling in central Bristol Bay could have significant implications. A contaminant released near or at the bottom could be carried upwards to the surface and incorporated into the food chain there at the primary productivity level. (Vertical mixing might also act to mix bottom contaminants to the surface.) Such biological contamination could result in concentration of undesirable substances at the higher food levels, for example, fish. This is particularly significant because Bristol Bay contains one of the World's major fisheries. (Sinha-OEIS)
W77-03237

ASPECTS OF THE CHEMICAL VARIABILITY OF SOME TASMANIAN INLAND WATERS (AUSTRALIA),
Tasmania Univ., Hobart (Australia). Dept. of Botany.
For primary bibliographic entry see Field 2K.
W77-03283

A STUDY OF THE SUSPENDED PARTICULATE PROBLEM IN THE DUWAMISH BASIN,
Boeing Co., Seattle, Wash.
R. H. Olsen, M. Y. Almassy, and A. L. Wingert.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-245 154, Price codes: A05 in paper copy, A01 in microfiche. Report EPA 910/9-75-010, May 1975. 81 p, 35 fig, 19 tab, 20 ref, 1 append. EPA 68-02-1499.

Descriptors: *Air pollution, *Surveys, *Washington, *Suspended solids, Dusts, Fly ash, Pollen, Pollutants, Path of pollutants, Winds, Industries, Industrial wastes, Chemical analysis, Particle size, Electron microscopy, Sampling, *Pollutant identification.
Identifiers: *Duwamish Basin(Wash), *Seattle(Wash).

Air quality data accumulated since 1965 indicate that the primary and secondary national air quality standards have been exceeded in the Duwamish Basin area of Seattle, Washington. The objectives of this study were to determine the nature of suspended particulate and, subsequently, to quantify the impact of particulate sources. Ambient and source particulate was collected on fiberglass and membrane filters. Results from gravimetric, elemental, and compound analyses were combined with meteorological data for correlation and analysis. The contribution of sources for the basin was found to be 27% from natural sources, 39% transportation, and 34% point industry and multiple-area sources. Results from this study showed the complexity of suspended particulate. Source tests showed a multitude of elements and compounds present and, to complicate matters, that surrounding soil has been contaminated by industrial and area sources. About 35% of the particulate is directly related to road dust-type emissions. (Sims-ISWS)
W77-03291

BEAR RIVER EVALUATION REPORT, 1974 SURVEY,
Environmental Protection Agency, Seattle, Wash. Region X; and Environmental Protection Agency, Seattle, Wash. Surveillance and Analysis Div.
For primary bibliographic entry see Field 5B.
W77-03292

COMPUTER MAPPING OF WATER QUALITY IN SAGINAW BAY WITH LANDSAT DIGITAL DATA,
Bendix Aerospace Systems Div., Ann Arbor, Mich.
R. H. Rogers, N. J. Shah, J. B. McKeon, and V. E. Smith.
Available from the National Technical Information Service, Springfield, VA 22161 as N76-16547, Price codes: A02 in paper copy, A01 in microfiche. Report BSR 4213, January 1976. 13 p, 4 fig, 2 tab, 7 ref. NASA NAS5-20942.

Descriptors: *Remote sensing, *Water quality, *Lake Huron, *Satellites(Artificial), *Michigan, Sampling, Surveys, Chemical properties, Biological properties, Chlorides, Conductivity, Nitrogen, Phosphorus, Chlorophyll, Temperature, Turbidity, Data processing, Regression analysis.
Identifiers: *LANDSAT, *Saginaw Bay(Mich).

Computer techniques were developed for mapping water quality parameters from LANDSAT data, using surface samples collected in an ongoing survey of water quality in Saginaw Bay (Lake Huron), Michigan, sponsored by the Environmental Protection Agency. Chemical and biological parameters were measured on 31 July 1975 at 16 bay stations in concert with the LANDSAT overflight. Application of stepwise linear regression to seven of these parameters and corresponding LANDSAT measurements resulted in regression correlation coefficients that varied from 0.94 for temperature to 0.71 for Secchi depth. Chloride, conductivity, total Kjeldahl nitrogen, total phosphorus, and chlorophyll were best correlated with the ratio of LANDSAT Band 4 to Band 5. Temperature and Secchi depth were best correlated to Band 5. Results of the regression analysis were used to map the water quality parameters over the entire bay. (Sims-ISWS)
W77-03305

MAPS SHOWING GROUND-WATER CONDITIONS IN THE SAN SIMON AREA, COCHISE AND GRAHAM COUNTIES, ARIZONA, AND IN HIDALGO COUNTY, NEW MEXICO--1975,
Geological Survey, Tucson, Ariz. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-03327

MAPS SHOWING GROUND-WATER CONDITIONS IN THE SAN BERNARDINO VALLEY AREA COCHISE COUNTY, ARIZONA--1975,
Geological Survey, Tucson, Ariz. Water Resources Div.

For primary bibliographic entry see Field 7C.
W77-03328

GROUND-WATER QUALITY DATA FOR GEORGIA,
Geological Survey, Doraville, Ga. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-03333

BURIED AQUIFERS IN THE BROOTEN-BELGRADE AND LAKE EMILY AREAS, WEST-CENTRAL MINNESOTA--FACTORS RELATED TO DEVELOPING WATER FOR IRRIGATION,
Geological Survey, St. Paul, Minn. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-03335

APPRAISAL OF WATER RESOURCES IN THE HACKENSACK RIVER BASIN, NEW JERSEY,
Geological Survey, Trenton, N. J. Water Resources Div.
For primary bibliographic entry see Field 2E
W77-03336

MEASUREMENT OF 'TURBIDITY' AND RELATED CHARACTERISTICS OF NATURAL WATERS,
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 7B.
W77-03339

HYDROLOGIC STUDIES BY THE U.S. GEOLOGICAL SURVEY IN OIL-SHALE AREAS OF COLORADO, UTAH, AND WYOMING, 1976.
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 4B.
W77-03340

CHEMICAL AND BACTERIOLOGICAL QUALITY OF WATER AT SELECTED SITES IN THE SAN ANTONIO AREA, TEXAS, AUGUST 1968 - JANUARY 1975,
Geological Survey, Austin, Tex. Water Resources Div.
R. D. Reeves.
Report of Edwards Underground Water District, San Antonio, Texas, August 1976. 122 p, 3 fig, 2 tab, 17 ref.

Descriptors: *Water quality, *Groundwater, *Surface water, *Chemical analysis, *Wa
Identifiers: *San Antonio area(Tex), Edwards aquifer.

Water samples collected in the San Antonio, Tex., area, from 161 wells and 3 springs in the Edwards aquifeter supply, Domestic water, Inorganic compounds, Bacteria, Trace elements, Heavy metals, Pesticides, Path of pollutants.
W77-03343

SUMMARY OF GEOLOGY AND GROUND-WATER RESOURCES OF PASSAIC COUNTY, NEW JERSEY,
Geological Survey, Trenton, N.J. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-03345

GROUND-WATER RESOURCES OF GREELEY AND WICHITA COUNTIES, WESTERN KANSAS,
Geological Survey, Lawrence, Kans. Water Resources Div.; and Geological Survey, Lawrence, Kans.
For primary bibliographic entry see Field 4B.
W77-03347

SELECTED DATA ON WATER WELLS, GEOTHERMAL WELLS, AND OIL TESTS IN IMPERIAL VALLEY, CALIFORNIA,
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-03348

DATA ON SELECTED LAKES IN WASHINGTON, PART 5,
Geological Survey, Tacoma, Wash. Water Resources Div.
For primary bibliographic entry see Field 7C.
W77-03350

WATER QUALITY SIMULATION OF TAHOE-TRUCKEE SYSTEM, NEVADA-CALIFORNIA - VOLUME II - APPENDICES,
Nevada Univ., Reno. Center for Water Resources Research.
J. A. Westphal, J. V. A. Sharp, and R. I. Bateman.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-247 799, Price codes: A13 in paper copy, A01 in microfiche. Report EPA-600/2-76-005b, January, 1976. 296 p, 20 fig, 8 tab.

Descriptors: *Water quality, *Simulation analysis, *Model studies, *Rivers, *Tributaries, Surface waters, *California, *Nevada, Inorganic compounds, Bicarbonates, Chlorides, Sulfates, Sodium, Potassium, Calcium, Magnesium, Silica, Solid wastes, Computer models
Identifiers: Tahoe-Truckee system(Calif-Nev).

Documentation for a digital inorganic water quality simulation model of the Tahoe-Truckee System which consists of the mainstem and tributaries of the Truckee River between Tahoe City, California and Nixon, Nevada is presented in the form of appendices. The model is based on the principle of mass-flux balance and presumes that inorganic constituents are conservative, complete mixing occurs instantaneously, and that flows are recapitulated accurately at the defunct gaging station near Truckee, California. The model was developed from 3 yr of water quality data collected monthly at about 40 sites along the mainstem and tributaries. The appendices include: predictive equations, a computer program for the model, cumulative frequency distribution curves, a derivation of complete mixing equations, and simulation model output for bicarbonate, chloride, sulfate, sodium, potassium, calcium, magnesium, silica, and total dissolved solids. (Kreager-FIRL)
W77-03351

PRELIMINARY ASSESSMENT OF SUSPECTED CARCINOGENS IN DRINKING WATER: REPORT TO CONGRESS.
Environmental Protection Agency, Washington, D.C. Office of Toxic Substances.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-250 961, Price codes: A06 in paper copy, A01 in microfiche. Report No. EPA 560/4-75-005, December, 1975. 115 p, 16 tab, 89 ref.

Descriptors: *Potable water, *Water pollution, *Public health, *Water pollution effects, *Pollutant identification, Water purification, Chlorination, Asbestos, Inorganic compounds, Organic compounds, Polychlorinated biphenyls, Polymers, Pesticides, Hydrocarbons, Economics, Water pollution control, Disinfection, Radioactivity.
Identifiers: *Carcinogens, Polyvinyl chloride, Chlorinated hydrocarbons, Trihalomethanes, Chloroform, Nitrosamines.

A compilation of efforts by the Environmental Protection Agency to identify and control suspected carcinogens in drinking water is presented. Topics covered include: studies dealing with the nature and extent of drinking water, including analyses for polychlorinated biphenyls, polyvinyl chloride, nitrosamines, trihalomethanes, pesticides, suspected inorganic carcinogens, asbestos, and radioactivity; evaluations of the risks associated with contaminant levels in drinking water; the identification of drinking water contaminant sources (industrial sources, chlorination, municipal waste treatment discharges, agricultural chemicals); treatment techniques for controlling drinking water contaminants; and projected costs for removing carcinogenic contaminants from drinking water. Byproducts from chlorination (chloroform and other trihalomethanes) appear to be more easily prevented than removed. Two techniques currently being considered for avoiding trihalomethane formation are the use of an alternative to chlorine as the disinfectant and the removal of precursors that react with chlorine. (Kreager-FIRL)
W77-03360

WATER USAGE AND WASTEWATER CHARACTERIZATION AT A CROPS OF ENGINEERS RECREATION AREA,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Environmental Effects Lab.
N. R. Francingues, Jr, and A. J. Green, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A02 584. Price codes: A03 in paper copy, A01 in microfiche. Paper No. Y-76-1, January, 1976. 44 p, 7 fig, 10 tab, 5 ref.

Descriptors: *Recreation facilities, *Wastewater(Pollution), *Water requirements, *Water utilization, *Water management(Applied), Ammonia, Nitrogen compounds, On-site investigations, Monitoring, Design criteria, *Pollutant identification.

A field monitoring study to collect information on water usage and waste water characterization at Corps of Engineers recreation area was conducted in order to develop guidelines for assisting Corps of Engineers districts in optimizing the design and operation of recreation area waste water management systems. Water usage and waste water production rates were significantly less than those presently being used by Corps of Engineers districts. The characteristics of the waste water from the camping areas were not substantially different from those for picnic, rest, or other day-use areas (comparable to medium-strength domestic wastewater), except for ammonia nitrogen which was somewhat higher. It appears that the sizing of water supplies and waste water treatment facilities should be based on the number of occupied campsites in overnight areas and not on the number of people. Suggested design values for waste water treatment facilities serving Corps of Engineers recreation areas are tabulated. (Kreager-FIRL)
W77-03362

A REVIEW OF CLUSTERING TECHNIQUES WITH EMPHASIS ON BENTHIC ECOLOGY,
Portland State Univ., Oreg. Urban Studies Center.
J. D. Walker
Available from the National Technical Information Service, Springfield, VA 22161 as PB-241 230. Price codes: A03 in paper copy, A01 in microfiche. Intern Report, EPA Pacific Northwest Environmental Research Laboratory, Newport, Oregon, August 1974. 21 p, 33 ref.

Descriptors: *Numerical analysis, *Benthos, Animal groupings, Plant groupings, Analytical techniques, Pollutant identification, Marine biology, Benthic fauna, Benthic flora.
Identifiers: *Clustering techniques.

The ability of clustering techniques to sort out benthic community types makes them useful for

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ecting pollution stresses. This report reviews
hierarchical numerical clustering techniques
detail including benthic studies where these
thods were employed, and briefly considers
-hierarchical strategies. The hierarchical
tegies considered are agglomerative and divi-
e. Agglomerative hierarchies start with the in-
iduals and fuse groups up to the entire popula-
while divisive hierarchies start with the popu-
on and divide it down to the individuals. Ag-
merative strategies seem to have more inherent
blems than divisive, but are more popular in
rine ecology. The main problems with ag-
merative strategies are: (1) the computation
e required for large populations, since the fu-
process must run from the individual to the
re population, and (2) the tendency for minor
classification because the fusion starts at the
ividual level where chance anomalies are more
ly to occur. Most divisive strategies, though
as sensitive to these problems, are based on
nothetic division which requires considerable
ght in order to select the right attribute to di-
e the population into two groups as unlike as
sible. Non-hierarchical strategies do not define
ute between groups but optimize the structure
the group by making it as homogeneous as
sible. However, their current state of develop-
nt lags far behind that of hierarchical systems
they have received little interest in benthic
dies. (Luedtke-Wisconsin)
7-03372

LAWARE 1975 STATE WATER QUALITY VENTORY,
partment of Natural Resources and Environ-
ntal Control, Dover, Dela. Div. of Environmen-
Control.
primary bibliographic entry see Field 5G.
7-03378

TER POLLUTION SURVEILLANCE IN THE ITED STATES. REPORT NUMBER 1, MIS-URI RIVER MAIN STEM, 1958-1962.
lic Health Service, Washington, D. C. Water
lity Section.
ailable from the National Technical Informa-
Service, Springfield, VA 22161 as PB-250 546,
e codes: A05 in paper copy, A01 in microfiche.
4. 99 p. 28 fig., 20 tab., 25 ref.

scriptors: *Missouri River, *Water quality, In-
state rivers, River systems, River basins, River
ulation, Monitoring, Data collections, On-site
a collections, Water analysis, Sampling, Time
es analysis, North Dakota, South Dakota,
raska, Kansas, Missouri, Physical properties,
mical properties, Coliforms, Radioactivity,
anic matter, Plankton, Suspended solids.
ntifiers: Water quality surveillance, Wil-
on(N Dak), Bismarck(N Dak), Yankton(S
), Omaha(Nebr), St. Joseph(Mo), Kansas
(Kan), St. Louis(Mo), Water quality criteria,
ter quality parameters.

hough surveillance data from seven stations
g the Missouri River from Williston, North
kota to St. Louis, Missouri show that water
lity criteria in the main stem tended toward
er quality during the four years of the study,
waters are suitable--with treatment--for mu-
pal and industrial use, and some of the nega-
criteria trends could be reversed with the con-
ction of scheduled treatment facilities.
sently, however, recreational values in the
er segment of the main stem are severely
ted because of municipal and industrial wastes.
ting stations other than Williston and St. Louis
e Bismarck, N.D., Yankton, S.D., Omaha,
., St. Joseph, Mo. and Kansas City, Kans. A
e series was prepared for each of 23 physical,
mical and biological water quality parameters
each station, and analogs were computer-
ted from magnetic tapes. Determinations of
ent levels, cyclic variations and trends were
ed on subjective curve-fitting and analysis.
Parameters included: temperature, dissolved oxygen, biochemical oxygen demand, chemical oxygen demand, chlorine demand, turbidity, color, pH, sodium, potassium, chloride, sulfate, alkalinity, hardness, total dissolved solids, longitudinal variations in major constituents, U.S. Geological Survey data, ammonia nitrogen, monor constituents, coliform bacteria, radioactivity, carbon adsorption, organic analyses and phytoplankton. (Harris-Wisconsin)
W77-03379

VIRUS AND BACTERIAL REMOVAL FROM WASTE WATER BY LAND TREATMENT,
Agricultural Research Service, Pheonix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 5D.
W77-03447

MUSSEL TEST FOR BIOLOGICAL CONTROL OF WATER POLLUTION (KAGYLO-TESZT VIZSENNYEZESEK BIOLOGIAI HATASANAK VIZSGALATARA),
J. Salanki.
Hidrologiai Kozlong, Vol. 56, No. 6, p 281-282, June, 1976. 3 fig, 5 ref.

Descriptors: *Mussels, *Bioindicators, *Monitoring, *Water pollution, Freshwater fish, Heavy metals, Oxygen, Pollutant identification.

The use of the fresh water mussel (Anodonta cygnea) as a biological indicator of water pollution is proposed. The fresh water mussel is a typical filter-feeding animal and reacts to various substances dissolved in the water by changes in the rhythmic and periodic activity of its adductor muscles. This activity can be monitored by recording the position and movement of the animal's shells which in turn reflect the concentration of pollutants like heavy metals as well as the oxygen level of the water. (Kreager-FIRL)
W77-03454

GROUNDWATER QUALITY ADJACENT TO A SEPTIC TANK SYSTEM,
ADI, Ltd., Fredericton (New Brunswick).
For primary bibliographic entry see Field 5D.
W77-03456

THE ELECTROLYTIC RESPIROMETER - I. FACTORS AFFECTING OXYGEN UPTAKE MEASUREMENTS,
Iowa State Univ., Ames. Dept. of Civil Engineering.
J. C. Young, and E. R. Baumann.
Water Research, Vol. 10, No. 11, p 1031-1040, 1976. 11 fig, 1 tab, 10 ref.

Descriptors: *Biochemical oxygen demand, *Measurement, *Pollutant identification, *Electrolysis, Oxygen requirements, Equipment, Pressure, Mixing.
Identifiers: *Respirometers, *Oxygen uptake.

A more complete and accurate measurement of the biochemical oxygen demand (BOD) of waste waters can be provided by the electrolytic respirometer. The apparatus has three major parts: a reaction vessel containing the sample and a magnetic stirring bar or other mixing device; an adaptor unit or alkali container with potassium hydroxide or another solution which absorbs metabolically produced carbon dioxide from atmosphere above sample; and a manometer cell containing a weak electrolyte (sulfuric acid or sodium hydroxide) which detects pressure changes and acts as an oxygen generator to maintain a constant partial pressure in the atmosphere of the sample container. The system is simple and provides a continuous oxygen uptake readout. Errors in measurement are usually contributed to the mixing rate and the concentration of oxygen demanding organic material in the sample. Increased mixing or oxygen enrichment of the air contacting the sample can overcome oxygen transfer limitations. Control of barometric pressure in the manometer cell is important since changes will alter oxygen readings. Corrections with this system are easily made. The coefficient of variability was less than 3.5% for samples with an ultimate BOD value between 20 and 500 mg/liter. BOD measurement is more precise with the electrolytic respirometer than with the dilution method. (Collins-FIRL)
W77-03457

MODEL STUDIES IN AQUEOUS CHLORINATION: THE CHLORINATION OF PHENOLS IN DILUTE AQUEOUS SOLUTIONS,
Waterloo Univ. (Ontario). Dept. of Chemistry.
J. G. Smith, S. F. Lee, and A. Netzer.
Water Research, Vol 10, No 11, p 985-990, 1976. 2 fig, 1 tab, 25 ref.

Descriptors: *Chlorination, *Phenols, *Municipal wastes, Water pollution effects, Waste water treatment, Solvent extractions, Chromatography, Water analysis.
Identifiers: Aqueous chlorination.

To further elucidate well known reactions of phenol which, when present as a contaminant of water supplies, can lead to unpleasant taste and odor in the chlorine-treated end product, model studies were performed to determine the end products of chlorination of phenols in aqueous solutions. Phenols tested were 2,4,6-trichlorophenol; 2,3,4,6-tetrachlorophenol; pentachlorophenol; and p-nitrophenol. These were examined at initial pH's of 6.0 and 3.5, the reaction products isolated by solvent extraction, the mixtures separated by column chromatography and the products identified by their spectral properties. It was found that chlorine displaced the nitro group and there was an aromatic substitution to a more highly chlorinated phenol. Phenol was also oxidized to a chlorinated benzoquinone. There was the addition of one mole of chlorine to the phenol to form chlorinated 2,5-cyclohexadienones and the addition of two moles of chlorine or hypochlorous acid to form chlorinated cyclohexenones and/or chlorinated hydroxycyclohexenones. Minor amounts of octachlorocyclohexadiene (from tetra- and pentachloro-phenols) and octachlorodibenzodioxin (from pentachlorophenol) were isolated. It was concluded that chlorination of phenols in dilute aqueous solution can produce highly chlorinated non-phenolic products. (Collins-FIRL)
W77-03458

EFFECT OF WATER CHLORINATION UPON LEVELS OF SOME POLYNUCLEAR AROMATIC HYDROCARBONS IN WATER,
Imperial Coll. of Science and Technology, London (England). Dept. of Public Health Engineering.
For primary bibliographic entry see Field 5F.
W77-03459

CYANOPHAGE ANALYSIS AS A BIOLOGICAL POLLUTION INDICATOR-BACTERIAL AND VIRAL,
North Carolina Univ. at Greensboro. Dept. of Biology.
C. T. Smedberg, and R. E. Cannon.
Journal Water Pollution Control Federation, Vol 48, No 10, p 2416-2426, October, 1976. 4 fig, 4 tab, 26 ref.

Descriptors: *Analytical techniques, *Viruses, *Coliforms, *Monitoring, *Sewage treatment, Measurement, Indicators, On-site investigations, Waste water treatment, Performance, Biological treatment, Trickling filters, Chlorination, Screens, Feasibility studies.

The use of the non-pathogenic, blue-green algal virus LPP-1 as an indicator of virus and coliform presence in waste water was investigated during

field studies at a sewage treatment plant. This cyanophage attacks the filamentous, non-blooming blue-green algal genera Lyngbya, Phormidium, and Plectonema and can be used as an inexpensive monitor of virus and coliform removal from waste water. Its natural presence in waste water and its resistance to chlorination make it especially attractive as an indicator of animal viruses. Since the presence of cyanophages in waste water is paralleled by coliform presence, LPP-1 can also be used to detect fecal pollution. Results obtained with this monitoring test are tabulated for composite samples of waste water taken at initial screening points, before and after trickling filtration, and after chlorination. (Kreager-FIRL)
W77-03460

USE OF INTRINSICALLY SAFE INSTRUMENTATION.
Water Services, Vol. 80, No. 964, p 356-357, June, 1976. 2 ref.

Descriptors: *Monitoring, *Analytical techniques, *Sewage treatment, *Explosions, *Gases, Electrical equipment, Design criteria, Safety, Treatment facilities.

Safeguards to prevent flammable gas explosions triggered off by electrically-operated monitoring equipment used within sewage collection networks and at sewage treatment plants are discussed. Monitoring and control equipment is frequently made intrinsically safe by the use of shunt diode barriers which effectively remove the risk of incendive levels of energy breaking through from remotely mounted equipment. The majority of shunt diode barrier applications in the sewage industry are straightforward and include the use of switches, thermocouples, resistance elements, thermometers, and solenoid pilot valves in pneumatic systems. Magnetic flowmeters are made safe by encapsulating the coil and increasing the safety terminal compartment. The probes and detecting circuit are normally made safe by the use of shunt diode safety barriers. (Kreager-FIRL)
W77-03462

MONITORING OF COMMUNITY WATER SUPPLIES,
Ontario Ministry of the Environment, Toronto. Pollution Control Branch.
P. D. Foley, and G. A. Missingham.
American Water Works Association Journal, Vol. 68, No. 2, p 105-111, 6 tab, 11 ref, 1 append.

Descriptors: *Monitoring, *Water supply, *Water quality, Gas chromatography, Mass spectroscopy, Heavy metals, Organic compounds, Potable water, Analytical techniques, Public health, Electron microscopy, *Pollutant identification, *Canada.
Identifiers: *Ontario.

Water quality in Ontario, Canada, was subjected to an in depth monitoring program. New and improved analytical techniques such as the electron-microscope and gas chromatograph-mass spectrometer-computer analysis were used to confirm the presence of various substances at low concentrations in water supplies. Great concern was shown towards substances known to be toxic at great concentrations or carcinogenic. Substances investigated were asbestos, heavy metals, and organics. Resultant analyses indicated that the asbestos in water does not penetrate the gut wall and is not a health hazard. Heavy metals were not seen as a major problem. Their problems consist of particles from lead services or copper piping in the distribution system. High copper levels are controlled by raising the water pH, which lessens the lead problem, though that may require replacement of lead. Organic analysis revealed a great low-level incidence of haloforms. In drinking water, the only organic with an assessable history was found to be chloroform. It was not considered a health hazard. Pesticide and herbicide levels were not considered dangerous. It was finally concluded that the great differences in the orders-of-magnitude in doses and concentrations prevent any definite conclusions. (Collins-FIRL)
W77-03463

INVESTIGATIONS ON THE IMPORTANCE OF THE ORGANIC CHLORO-COMPOUNDS AND THEIR ADSORBABILITY (UNTERSUCHUNGEN ZUR BEDEUTUNG DER ORGANISCHEN CHLORVERBINDUNGEN UND IHRER ADSORBIERBARKEIT),
W. Kuehn, and F. Fuchs.
Vom Wasser, Vol. 45, p 217-232, 1975. 8 tab, 25 ref.

Descriptors: *Pollutant identification, *Analytical techniques, *Treatment facilities, *Organic compounds, *Chlorine, Adsorption, *Water treatment, Chlorination, Dewatering, Incineration, Activated carbon.
Identifiers: Pyrohydrolysis.

Pyrohydrolysis, used to analytically determine organic chloro-compounds, also shows interesting results for controlling water treatment plants for the concentration in water of these compounds. Results for DMF-extract, dioxane extract, non-polar organic chlorine and total organic chlorine in activated carbon samples from water works are given. Values for Lake Constance, the Rhine, and several other rivers were measured, and these substances' origins are discussed. More highly activated carbon is more selective for organic chlorine than lower activated carbon. (Snyder-FIRL)
W77-03465

A NEW METHOD OF AUTOMATIC DETERMINATION OF NITRATE IN WASTE WATERS AND POLLUTED SURFACE WATERS (EIN NEUES VERFAHREN ZUR AUTOMATISCHEN NITRAT-BESTIMMUNG IN ABWAESSERN UND BELASTETEN OBERFLAECHENWAESSERN),
R. Wagner, I. Frommert, and R. Koenig.
Vom Wasser, Vol. 45, p 271-284, 1975. 9 fig, 18 ref.

Descriptors: Surface waters, *Pollutant identification, *Sewerage, *Analytical techniques, *Automation, *Nitrates, Waste water(Pollution), Effluents, Ions, Water pollution, Instrumentation.
Identifiers: Receiving streams, P-fluoro phenol method.

For manual nitrate determination in sewage, plant effluents, and receiving streams, the p-fluoro phenol method is very successful. Nitrate ions form 2-nitro-4-fluoro phenol in a nitration step included in the method. The 2-nitro-4-fluorophenol is transferred to an alkaline recipient by steam distillation, producing a yellow solution for spectrophotometric measurement. An AutoAnalyzer system, including distillation with a new pass through unit to heat the sample stream, based on a boiling thermostat, which is located in front of the distillation head, was prepared for automatic performance of the p-fluoro phenol method. The manifold is adapted for between about 0.1 and 30 ppm nitrate nitrogen; the sample frequency is 10 per hour. This automatic method may also be used in cases in which methods based on partial nitrate ion reduction to nitrite ions, due to irregular reduction rates, do not give reliable results. (Snyder-FIRL)
W77-03466

ULTRAVIOLET PURIFICATION SYSTEM.
Mechanical Engineering, Vol. 98, No. 6, p 51, August, 1976.

Descriptors: *Monitoring, *Ultraviolet radiation, Potable water, Sewage treatment, Water treatment, Waste water treatment, Economics, Disinfection, Bacteria, Viruses, *Pollutant identification.

An automatic, self-monitoring system using ul traviolet radiation was developed to provide a con tinuous flow of bacteria-free process, product, o drinking water. Its capacity ranges from 6 t 100,000 gallons per minute. Sewage effluent is dis infected and all bacteria and viruses are destroye without harmful chemical by-products. Color taste, and pH are not changed. Components are stainless steel purification chamber with high-in tensity ultraviolet lamps, remotely housed electri cal components and controls, a water qualit monitor, and in-place cleaning capability. Opera tions are continuously monitored and any discre pancy is immediately indicated. It has proved to b an economical treatment process. (Collins-FIRL)
W77-03467

NITRATE MONITORING.
Water Services, Vol. 80, No. 964, p 357-358, June 1976. 1 fig.

Descriptors: *Nitrogen, *Waste water treatment *Sewage treatment, *Pollutant identification *Analytical techniques, *Treatment facilities *Nitrates, Monitoring, Sewerage, Potable wate Water quality standards.

The World Health Organization has fixed a lim for nitrate in potable water of 11.3 mg/liter nitrat as nitrogen. One major source of nitrate is sewag effluent, since nitrates are derived from ammon um compounds during secondary treatment in no mal aeration plants and conventional sewage trea ment has little effect on nitrate levels. Ion-selec tive electrode analysis for nitrate measuremen has a wide range of applications and is compara tively unaffected by strong or highly colored sol tions and suspended solids but requires frequen standardization and constant temperature contr or compensation. Continuous monitoring is esse tial to prevent undetected gross pollution, and suitable continuous monitor designed for on-lin analysis has been developed. Measurement made by a preset expanded scale pH amplifie The sample is drawn from a constant head uni through a heat exchanger and then pumped past mixing cell fitted with the nitrate and referenc electrodes. The first major use of this monitor fo nitrate was northeast of London on the River Le which carries a high sewage effluent loading. Th River Lee is also monitored for pH, temperatur dissolved oxygen, conductivity, suspended solid and ammonia. Nitrate monitoring was added to th network in 1973. Nitrate has been shown to be us ful for assessing pollution loading and denitrifica tion. (Snyder-FIRL)
W77-03468

MICROBIOLOGICAL EXAMINATION O WATERS AND EFFLUENTS,
Canada Centre for Inland Waters, Burlingto (Ontario).
B. J. Dutka.
ASTM Standardization News, Vol. 4, No. 1, p 1 21, January, 1976. 1 tab.

Descriptors: Water quality, *Standards, *Wate analysis, Bacteria, Microorganisms, Bioassay *Pollutant identification, *Water quality sta dards, Microbiology.

Some form of standardized water quality estima tion procedures is needed to rectify the preser situation in which analysts use many individuall favored methods. Because of the many uses o bacteria as a tool in assessing water and effluent standardization is necessary for meaningful dat Bacteriologists and microbiologists were co sulted on a world-wide basis for input into th development of international standard procedure Also an ASTM committee was charged wit developing such procedures. One major concern media formulation. The goals of this group are t define organism under study, to develop a simpl biochemical definition of the organism, and t prepare isolation and enumeration procedures ap plicable to a variety of samples. (Collins-FIRL)

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7-03470

E AERIAL PHOTO-WATER QUALITY
K.
ironmental Science and Technology, Vol. 10,
3, p 228-229, March, 1976.

criptors: *Eutrophication, *Lakes, *Analytical
niques, *Aerial photography, Color, Algae,
llutant identification, *Remote sensing.

ew technique of analyzing aerial photography
applied to the study of eutrophication in lakes.
progression of eutrophication in lakes is ac-
panied by a change in water color from blue to
n. The higher the concentration of algae, the
ner the water color. One problem involved
whether satellite or aircraft should be used in
photography. Aerial photography has the ad-
tage of being able to sample an entire lake in
utes or hours, rather than in days as with sur-
craft. New processing procedures allow so-
ticated color separation which can be analyzed
etermine areas where eutrophication is either
nning or increasing. Corrections may be made
atmospheric conditions which might interfere
photo interpretation. This process is being im-
ed and can provide immense detailed informa-
to scientists who must deal with this problem.
lins-FIRL)
7-03471

E LIMITATION OF THE RATIO OF FECAL
LIFORMS TO TOTAL COLIPHAGE AS A
TER POLLUTION INDEX,
artment of Agriculture, Lethbridge (Alberta).
. Bell.
er Research, Vol. 10, No. 8, p 745-748, 1976. 1
2 tab, 11 ref.

criptors: *Pollutant identification, *Waste
er treatment, *Sewage treatment, *Sewerage,
alytical techniques, Treatment facilities, E
*Bacteriophage.
ntifiers: *Coliphage.

udy was undertaken to determine whether the
of fecal coliform bacteria to total coliphage in
sewage, sewage lagoon effluent, or river
er, had any significance as a pollution index.
al coliform populations were determined using
most probable number technique. Total
hage populations were determined using
herichia coli B host cells. The ratios of fecal
orms to coliphage were 87:1, 4.2:1, and 0.15:1,
ectively. The ratio of fecal coliforms to
hage in stored raw sewage decreased to about
within 7 days at 20C and within 28 days at 4C.
changes resulted from the greater longevity of
coliphage. The ratio of fecal coliforms to
hage is not considered a reliable index of
l pollution because it is influenced by prior
amination, presence of sediment, chlorina-
and temperature. (Snyder-FIRL)
7-03472

ECT OF VARIABLE LOADING ON OX-
N UPTAKE,
State Univ., Ames, Dept. of Civil Engineer-

primary bibliographic entry see Field 5D.
7-03473

ID DETECTION OF BACTERIAL EN-
TOXINS IN DRINKING WATER AND
OVATED WASTE WATER,
is Univ. Health Science Center at San An-
. Dept. of Pathology.
Jorgensen, J. C. Lee, and H. R. Pahren.
lied and Environmental Microbiology, Vol.
No. 3, p 347-351, September, 1976. 2 tab, 17

Descriptors: *Pollutant identification, *Analytical techniques, *Toxins, *Pathogenic bacteria, *Potable water, *Reclaimed water, Waste water(Pollution), Tertiary treatment.
Identifiers: *Endotoxins, *Limulus assay.

Experiments were conducted to determine the applicability of using the Limulus assay to measure endotoxins in potable waters and highly treated waste waters. Twenty-five samples of drinking water and Advanced Waste Treatment (AWT) process samples from around the United States were tested. The Limulus test was easily adapted to water testing without modification of the assay procedure. This investigation showed that this method could be used to test water samples for pyrogenic substances, i.e., gram-negative bacterial endotoxins. It was proven simple, relatively inexpensive, sensitive, and reliable. Other advantages determined were rapidity (total test time of less than 2 hr), no need for specialized equipment or facilities for maintaining lab animals, and it can be performed with little difficulty in any microbiology laboratory after short specialized instruction. (Collins-FIRL)
W77-03474

TRANSFERABLE DRUG RESISTANCE ASSOCIATED WITH COLIFORMS ISOLATED FROM HOSPITAL AND DOMESTIC SEWAGE,
Florida Univ., Gainesville. Dept. of Environmental Engineering Sciences.
T. D. Fontaine, III, and A. W. Hoadley.
Health Laboratory Science, Vol. 13, No. 4, p 238-245, October, 1976. 1 fig, 4 tab, 20 ref.

Descriptors: *Waste water treatment, *Sewage treatment, *Sewerage, *Pollutant identification, Treatment facilities, Resistance, Coliforms, Hospitals.
Identifiers: Drug resistance, Hospital wastes.

A study was performed to determine the extent to which hospital wastes may serve as reservoirs for the spread of antibiotic-resistant fecal coliforms and their associated risk transfer factors in the environment. Samples of hospital, campus, and combined waste streams entering the University of Florida treatment plant were collected, as well as samples of treated effluent before chlorination and polishing pond effluent. Of 41 bacterial strains isolated from hospital wastes, 90.2% were resistant to at least one antibiotic, in contrast to 55.5% of 54 isolates from campus wastes. The proportion of resistant strains able to transfer resistance varied from 50% to 90%, depending on season and source. Transfer of as many as seven resistance determinants was demonstrated under the usual laboratory conditions. Populations of fecal coliforms were reduced by slightly more than 90% by treatment prior to chlorination, but the proportions of isolates resistant to one or more antibiotics and able to transfer resistance did not change appreciably. The proportion of multiple resistant strains isolated from hospital wastes was twice that observed in campus wastes, and remained approximately constant through the treatment plant. The emergence of a population of Salmonella choleraesuis resistant to tetracycline in a laboratory of simulation of waste treatment processes provided preliminary evidence that resistance transfer may occur in sewage. (Collins-FIRL)
W77-03478

AEROSOL PRODUCTION BY IRRIGATION EQUIPMENT USED FOR LAND APPLICATION OF WASTE WATER,
Brookhaven National Lab., Upton, N. Y.
G. S. Raynor, and J. V. Hayes.
American Industrial Hygiene Association Journal, Vol. 37, No. 9, p 526-536, September, 1976. 9 fig, 4 tab, 8 ref.

Descriptors: *Pollutant identification, *Sewerage, *Aerosols, *Irrigation practices, *Irrigation systems, Application equipment, Land use, Waste water(Pollution), Water reuse.

Experiments were conducted to determine the size distribution and concentration of aerosols and drops from dilute untreated sewage sprayed through agricultural irrigation systems. Experiments were conducted at specified pressures for each nozzle system over a wide range of wind speed, temperature, and relative humidity. Output rate, flow rate through each sampler and meteorological conditions were measured during testing. Testing was done with four nozzle systems used for upland recharge of waste water. A small part of the liquid output was lost to drift droplets, but large quantities of small aerosols were produced, especially in the respirable size range. The typical system produced from 10 to the 13th power to 10 to the 14th power particles per spray acre with a rate of 50,000 gallons per acre per day. Fewer aerosols were produced at low wind speeds from low spraying nozzles. A shorter operating time and exposure to wind may result in fewer aerosols at greater flow rates if fixed amounts of liquids must be emitted. Under typical atmospheric conditions, centerline concentrations decrease from one to two orders of magnitude in a travel distance of 1 km near ground level. (Collins-FIRL)
W77-03484

RISK OF COMMUNICABLE DISEASE INFECTION ASSOCIATED WITH WASTE WATER IRRIGATION IN AGRICULTURAL SETTLEMENTS,
Hadassah Medical School, Jerusalem (Israel). Environmental Health Lab.
For primary bibliographic entry see Field 5C.
W77-03485

IDAHO ENVIRONMENTAL OVERVIEW,
Consulting Engineers, Inc., Boise, Idaho.
For primary bibliographic entry see Field 6G.
W77-03557

DETERMINATION OF MAXIMUM PERMISSIBLE LEVELS OF SELECTED CHEMICALS THAT EXERT TOXIC EFFECTS ON PLANTS OF ECONOMIC IMPORTANCE IN ILLINOIS,
Southern Illinois Univ., Carbondale.
J. H. Yopp, W. E. Schmid, and R. W. Holst.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-237 654, Price codes: A12 in paper copy, A01 in microfiche. Illinois Institute for Environmental Quality, Chicago, Report No 74-33, August 1974. 272 p, 27 tab, 525 ref.

Descriptors: *Phytotoxicity, *Chemicals, *Trace elements, *Air pollution effects, *Agronomic crops, *Horticultural crops, *Vegetable crops, *Soil contamination effects, *Illinois, Standards, Aluminum, Cadmium, Chlorine, Chromium, Copper, Fluorine, Lead, Manganese, Mercury, Molybdenum, Nickel, Nitrogen compounds, Nitrates, Ozone, Sodium, Sulfur, Resistance, Public health, Sulfates, Sulfides, Zinc, Forests, Water quality standards.
Identifiers: Barium, Beryllium, Boron, Ethylene, Bromide, Nitrogen dioxide, Peroxyacetyl nitrate, Selenium, Sulfur dioxide, Hydrogen sulfide, Thallium, Vanadium.

Based on comprehensive literature surveys, maximum permissible levels are proposed for aluminum, barium, beryllium, boron, bromide, cadmium, carbon-ethylene, chlorine, chromium, copper, fluorine, lead, manganese, mercury, molybdenum, nickel, nitrogen dioxide, peroxyacetyl nitrate, ammonia, nitrate, ozone, selenium, sodium, sulfur dioxide, sulfate, hydrogen sulfide, thallium, vanadium, and zinc in Illinois soils and air to avoid phytotoxicity of agronomic, horticultural, and vegetable crops, and conifers. The phytotoxic levels were generally selected on the basis of the most sensitive species, but the

response of each plant varied with environmental factors, genotype, variety of the same species, growth stage, and nutritional status. Data of the degree of sensitivity (or tolerance) of economically important plants allows selection of species for culture which are adapted to the Illinois environmental and economic conditions. The symptomology of the various trace metals and oxides is discussed for specific plant types, as are the sources of the chemicals, and the biochemical responses. The absence of controlled studies on uptake of airborne particulates of these trace metals prevented any recommendations concerning permissible levels of these agents as air pollutants. The phytotoxicity of each element is discussed in a separate chapter, with tables ranking plants according to their economic importance and sensitivity. The maximum permissible levels are given for both airborne and soil forms of each element. (Auen-Wisconsin)
W77-03565

NATURE PRESERVATION ACTIVITY RR INVESTIGATION: PART 6. A MODIFIED METHOD OF MEASURING THE CHEMICAL OXYGEN DEMAND GIVES A HIGH ANALYTICAL CAPACITY, (IN SWEDISH),
Uppsala Kommun Naturvardsverkets RR-Undersokning (Sweden). Algestlab. Fysiol. Bot.
A. Forsberg, and S-O. Ryding.
Vatten 31(2), p 148-154, 1975.

Descriptors: *Sampling, *Water analysis, *Methodology, *Water treatment, *Water purification, Autoclaves, Oxidation, Mercury, Chlorine, Potassium, Manganese, Ions, Pollutant identification.
Identifiers: Recipient examination, Reagent volume, Dichromate concentration.

For a water control program based on frequent sampling, a simplified chemical O2 demand (COD) measurement method, the purification plant recipient examination (RR) method, was developed. The procedure includes small sample and reagent volume, rapid addition of a mixture of all reagents to the sample, exclusion of Hg, and autoclaving at 120C for 1 h. The yield by the RR-method was about 10% lower than that by the standard method, mostly due to decreased dichromate concentration and oxidation temperature. Correction For Cl- interference is unnecessary below 1 g Cl-/l; Hg addition has a significant influence on the results only in water samples with a higher Cl-concentration. The RR-method showed a good correlation to the values for KMnO4 consumption. A large number of water samples can be preserved by deep-freezing and analyzed quickly later on.
W77-03589

WATER QUALITY, PLANKTON AND EUTROPHICATION OF BERGSVATNET, EIKEREN AND FISKUMVATNET, S. NORWAY, (IN NORWEGIAN),
Norsk Institutt for Vannforskning, Blindern.
For primary bibliographic entry see Field 5C.
W77-03595

5B. Sources Of Pollution

DISTRIBUTION OF PELAGIC ZOOPLANKTON WITHIN A THERMAL GRADIENT IN LAKE COLUMBIA, A COOLING LAKE NEAR PORTAGE, WISCONSIN,
Wisconsin Univ., Madison. Lab., of Limnology.
For primary bibliographic entry see Field 5C.
W77-03077

DISTRIBUTION AND FEEDING OF PUMPKINSEED (LEPOMIS GIBBOSUS) AND BLACK CRAPPIE (POMOXIS NIGROMACULATUS) IN A POWER PLANT COOLING LAKE,
Wisconsin Univ., Madison. Lab. of Limnology.
For primary bibliographic entry see Field 5C.
W77-03078

SURF-ZONE WATER QUALITY IN LIVERPOOL BAY,
Lancaster Univ., Bailrigg (England). Lancashire and Western Sea Fisheries Joint Committee.
P. R. Hinchcliffe.
Estuarine and Coastal Marine Science, Vol. 4, No. 4, p 427-442, July 1976. 9 fig, 1 tab, 21 ref.

Descriptors: *Water quality, *Surf, *Bays, *Nutrients, *Eutrophication, Coasts, Shores, Estuaries, Phosphorus, Phosphates, Nitrogen compounds, Nitrites, Nitrates, Ammonia, Salinity, Coliforms, Hydrogen ion concentration, Suspended solids, Seasonal, Monthly, Foreign countries.
Identifiers: *Liverpool Bay, *Surf-zone, *Lancashire, *Mersey River.

Results of a continuing investigation of seasonal and long-term changes in surf zone water quality in Liverpool Bay were reported for the period 1971-1974. A total of thirteen sites was sampled at monthly intervals for all or part of that period. Of the sample constituents analyzed, salinity, pH, ammonia, and nitrite-nitrate demonstrated fairly predictable seasonal patterns. Dissolved oxygen remained near saturation level throughout. Dissolved reactive phosphate was buffered by large amounts of suspended matter and showed little seasonal variation. Coliform levels were higher in winter than summer, suggesting that increasing temperature produces higher die-off rates. The Mersey appeared to exert strong influence on the salinity and the concentrations of inorganic nitrogen and phosphorus on Liverpool Bay. Both phosphate and nitrate showed significant tendencies to increase over the four-year period. If these increases continue, excessive eutrophication of the bay seems probable in the near future. Monthly sampling at five Lancashire coastal sites is intended to continue indefinitely. (Bender-ISWS)
W77-03092

COASTAL REGION RESIDENCE TIME ESTIMATES FROM CONCENTRATION GRADIENTS,
Ontario Ministry of the Environment, Toronto.
For primary bibliographic entry see Field 5C.
W77-03093

RELATION BETWEEN ATMOSPHERIC POLLUTION, PRECIPITATION, AND STREAMWATER QUALITY NEAR A LARGE URBAN-INDUSTRIAL COMPLEX,
Illinois State Water Survey, Urbana.
F. A. Huff.
Water Research, Vol. 10, No. 11, p945-953, 1976. 3 fig, 7 tab, 12 ref. NSF GK-38329.

Descriptors: *Pollution, *Streamflow, *Urban runoff, *Missouri, *Air pollution, Water pollution, Chemicals, Chemical analysis, Sampling, Rainfall, *Precipitation(Atmospheric), Runoff, Fallout, Correlation analysis, Pollutants, Path of pollutants.
Identifiers: *St. Louis(Mo).

An investigation was made of the effects of atmospheric effluents from a large urban-industrial area (St. Louis) on the water quality in two small basins that are frequently downwind of the city. Analyses were made of the relative magnitude of the atmospheric contribution to streamwater pollution and how this contribution is related to weather conditions. Field sampling was done during a 15-month period, and investigation was made of atmospheric-streamwater relationships for storm, seasonal, and annual periods. Computations were made for 12 chemical constituents in the rainwater and streamwater. Results indicated that only minor changes usually occur in streamwater pollutant concentrations during and shortly following storms. Also, no strong relationship exists between streamwater concentration and weather conditions. For most pollutants, the atmospheric deposition was small compared with the annual stream load because of major surface sources. However, evidence was also found that urban-industrial sources can occasionally be important contributors to stream contamination. (Sims-ISWS)
W77-03097

PRECIPITATION CHEMISTRY STUDIES AT LAKE GEORGE: ACID RAINS,
Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Chemical Engineering and Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Environmetal Engineering.
For primary bibliographic entry see Field 5A.
W77-03098

ENVIRONMENTAL IMPACT OF LAND USE ON WATER QUALITY, PROGRESS REPORT,
Allen County Soil and Water Conservation District, Fort Wayne, Ind.
For primary bibliographic entry see Field 5G
W77-03106

OPTRM - A HYDROLOGIC TRANSPORT MODEL WITH PARAMETER OPTIMIZATION,
Oak Ridge National Lab. Tenn.
D. E. Fields, and S. B. Watson.
Report ORNL-NSF-EATC-14, September 1975. 131 p, 8 fig, 5 tab, 28 ref, 9 append. NSF W-7405-eng-26.

Descriptors: *Model studies, *Runoff, *Watersheds(Basins), *Path of pollutants, Computer models, Mathematical models, Computer programs, Tracers, *Optimization, Streamflow, Hydrologic systems, Water transfer, Water pollution, Hydrology.
Identifiers: *Hydrologic transport models.

A version of the Wisconsin Hydrologic Transport Model which incorporates a procedure for obtaining an optimal set of model parameters was implemented. An optimal set of parameters was defined to be that set which is derived by minimization of an objective function which quantifies the dissimilarity between observed and simulated hydrologic flow or contaminant transport values. Function minimization on either a monthly or daily basis was performed by a pattern search technique. A discussion of the OPtimized TRansport Model-(OPTRM) was followed by a user's guide to the model. Also included were simulations of Walker Branch Watershed in which selected sets of hydrologic and potassium transport-related parameters are determined. The appendixes contained listings of the computer programs used. (Sims-ISWS)
W77-03115

PERMISSIBLE LEVEL OF BENZO(A)PLYRENE IN WATER BODIES, (IN RUSSIAN),
Institut Eksperimentalnoi i Klinicheskoi Onkologii, Moscow (USSR).
A. P. Il'Nitskii.
Gig Sanit 3, p 100-104, 1975.

Descriptors: *Lethal limit, Data collection, *Toxicity, Water pollution, Rodents, Organic compounds.
Identifiers: Carcinogens, *Benzopyrene.

Two series of experiments were carried out to obtain basic data necessary for determining the permissible level of benzo(a)pyrene (BP) in water bodies. In the 1st series the effect of various doses of BP and its combinations with other polycyclic aromatic hydrocarbons was studied after oral administration to 2 strains of mice. In the 2nd series the effect of combined oral and intratracheal BP administration to random-bred rats was studied

data is analyzed in relation to possible ex-olation to humans.--Copyright 1976, Biological tracts, Inc.
7-03117

MPORAL VARIATIONS IN TRIBUTARY OSPHORUS LOADS,
gers - The State Univ., New Brunswick, N. J.
Tuffey, and F. B. Trama.
'Urbanization and Water Quality Control,' pple, W. Jr. (ed.), American Water Resources ociation, Proc. No. 20, June 1975, p 140-152. 7 8 ref. OWRT A-047-N.J.(1), 14-34-0001-7064.

criptors: Water quality, Water pollution rces, Nutrients, *Phosphorus, Phosphates.
tifiers: *Nonpoint source pollution, Storm nt pollution loadings, Temporal variations.

l tributary phosphorus loading can be dif-ntiated into that occurring during periods of flow steady state and minor rainfalls and that rring at high flow steady states (e.g., in the ng) and during major storms. During low flow ditions, relatively small loads are involved that probably adequately represented in the availa-data base. During high flow conditions induced torm events or seasonal patterns, major incre-ts in phsophorus load occur. A single storm nt contributed in a six-hour time period a TP that is the equivalent of a 30-day low flow dy state loading. Storm-induced phosphorus es can significantly contribute to the annual oad for other than urban watersheds. It is ex-ed that this effect would be even greater in n watersheds. Further studies are needed to ne the characteristics and sampling frequency essary to obtain a statistically reliable data for determining phosphorus loads trans-ed by tributary streams to receiving bodies of er.
7-03123

TER AND OIL ON THE SHORES OF UT-A, ROGALAND COUNTY, DURING AU-MN 1974, (IN DANISH),
Ree.
na (Oslo) 28(4), p 185-191, 1975.

criptors: *Oil pollution, Oil spills, *Birds, ter, Solid wastes, Waste disposal, Water pol-n sources, Shores, Path of pollutants.
tifiers: Alca-torda, Larus-argentatus, Larus-bundus, *Norway(Utsira area), Somateria-lissima, Sula-bassana, Uria-aalge, Utsira, *Sea s, Plotus-alle.

ing ornithological field work on Utsira rway) a survey was made of the rubbish and oil ution along the shores. A number of oiled sea s were observed: Somateria mollissima, Uria ae, Alca torda, Plotus alle, Sulu bassana, us argentatus and L. ridibundus. The pollution ation along coasts of Norway is getting worse. to its geographical position, Utsira is one of localities which will be affected first in the nt of an oil catastrophe in the North Sea.--yright 1976, Biological Abstracts, Inc.
7-03125

ITARY-BACTERIOLOGICAL STUDY OF E EFFECTIVENESS OF DECONTAMINAT-THE SEWAGE OF VOROSHILOVGRAD SEWAGE FARMS, (IN RUSSIAN),
oshilovgradskii Meditsinskii Institut (USSR).
primary bibliographic entry see Field 5D.
7-03128

E TRANSPORT OF POLLUTANTS IN OUND WATER, (IN GERMAN),
fornia Univ., Riverside. Dept. of Soil Science Agricultural Engineering.
Fluehler.
g Anst Anst Forstl Versuchswes Mitt 51(1), p 266, 1975.

Descriptors: *Path of pollutants, *Groundwater, Soils, Erosion, Water pollution sources, Sorption.

Transport, sorption and breakdown processes have greatly different effects on the erosion of various substances. The interrelationships between the substance transported, the soil and the ground water are very complex and must be simplified for a quantitative description. Established rules can be used only if the insignificant factors can be determined and eliminated. Possible simplifications and evaluation methods for substance transport in natural soils are discussed.--Copyright 1976, Biological Abstracts, Inc.
W77-03131

APPLICATION OF A MODEL FOR LAYOUT AND DESIGN OF SEWER SYSTEMS,
Illinois Univ. at Urbana-Champaign. Dept. of Civil Engineering.
L. W. Mays, H. G. Wenzel, Jr., and J. Liebman.
Paper presented at the 1976 Spring Annual Meeting of the American Geophysical Union, Washington, D.C., April 13-15, 1976. 10 p, 7 fig, 7 ref. OWRT C-4123(No. 9023)(6).

Descriptors: *Optimization, Urban drainage, Environmental engineering, Dynamic programming, Hydraulics, *Model studies, *Storm drains, *Design.
Identifiers: Urban development, Computer applications, Economic analysis.

An optimization model has been developed for the minimum cost layout and design of storm sewer systems. This model can be used to determine the optimal layout, size, and crown elevations of the sewer pipes and depths of the manholes. The optimization is achieved by using a screening model consisting of two conjunctive phases: a model for the combined layout and design and a supplementary design model for prescribed layouts. The combined layout and design model is an optimization procedure based upon discrete differential dynamic programming (DDDP) which simultaneously varies both the system layout and pipe design. Isonodal lines, which are imaginary lines separating manholes for investigation of possible pipe connections, are used to divide the system into stages for optimization. At each stage of the DDDP procedure, a connectivity model, which is formulated as a set-partitioning problem, is solved to determine the minimum cost layout for that stage. The combined layout and design model is an iterative stage by stage procedure resulting in a complete system layout and design after each iteration. When changes in the system layout occur for successive iterations of the combined model, the design model for given layouts is used to compute the optimal design of the previously generated layout by the combined layout and design model. The design model is also an iterative stage-by-stage optimization procedure based upon DDDP. The hydraulics of flow are accounted by using Manning's equation and peak flows at various manholes are added to compute flowrates for the connecting downstream pipes.
W77-03133

THE PHOSPHORUS POLLUTION OF WATERS DUE TO AGRICULTURE, (IN GERMAN),
Eidgenoessische Forschungsanstalt fuer Agrikulturchemie, Bern.
O. J. Furrer.
Eidg Anst Anst Forstl Versuchswes Mitt 51(1), p 267-283, 1975.

Descriptors: *Phosphorus, *Agricultural runoff, Water pollution sources, Agriculture, Fertilizers, Soil erosion, Path of pollutant.
Identifiers: *Switzerland.

Lysimetric studies and investigation on drainage, rain and surface water, and soil profiles were carried out. No danger of fertilizer phosphate erosion exists because it settles in the uppermost layers. This increases the washing away of surface phosphate; measures are suggested for inhibiting this. Agriculture causes less than 10% of the phosphate water pollution in Switzerland. Studies reporting the sources of phosphate pollution in Switzerland are reviewed.--Copyright 1976, Biological Abstracts, Inc.
W77-03134

PLANKTON OF COASTAL LAGOONS: XI. TRANSPORT IN THREE ESTUARIES OF THE NORTHWEST OF MEXICO (NOVEMBER, 1973) (IN SPANISH),
Universidad Nacional Autonoma de Mexico, Mexico City. Instituto de Biologia.
For primary bibliographic entry see Field 2L.
W77-03145

BEHAVIOR OF GROUND WATER SUBJECT TO IRRIGATION OF EFFLUENT - A CASE STUDY,
Maryland Univ., College Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W77-03158

THE RELATIONSHIP OF BOTTOM SEDIMENTS TO BACTERIAL WATER QUALITY IN A RECREATIONAL SWIMMING AREA,
Arizona Univ., Tucson. School of Renewable Natural Resources.
S. A. Winslow.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 259, Price codes: A04 in paper copy, A01 in microfiche. Master of Science, Thesis, 1976. 60 p, 10 fig, 3 tab, 31 ref. OWRT A-053-ARIZ(4). 14-34-0001-6003.

Descriptors: *Water quality, Recreation, *Arizona, Swimming, Water sports, Coliforms, *Bottom sediments, Lake sediments, *Bacteria, Water pollution sources, Pollutant identification.
Identifiers: *Recreational waters, *Bacteriological pollutions, Central Arizona, *Canyon Lake(Ariz).

A study was conducted at Acacia Beach, Canyon Lake, Arizona, to clarify the influence of sediment-stored fecal bacteria on swimming area water quality. An additional goal was to determine the value and potential applications of fecal coliform analyses of bottom sediments for use in sanitary evaluations of natural swimming areas. Concentrations of fecal coliform in sediment were found to be significantly higher during the swimming season than during the nonswimming season. Analyses frequently found large, unpredictable changes in sedimentary fecal coliform concentrations over short time periods. Fecal coliform concentrations in nearshore sediment at Acacia Beach are apparently strongly influenced by currents, wave action and sediment agitation by bathers. Methods of analysis used in this study were not able to quantitatively determine the influence of sediment-stored bacteria on the overlying water at Acacia Beach. Use of fecal coliform analyses of bottom sediments as a stable index of overlying water quality or as a predictive device cannot be made from information collected in this study. However, sediment sampling to supplement routine water sampling is recommended to provide a more complete indication of the total sanitary condition of natural swimming areas.
W77-03167

EFFECT OF ZINC-COATED CULVERTS ON VERTEBRATE AND INVERTEBRATE FAUNA IN SELECTED MAINE STREAMS,
Maine Univ., Orono. Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W77-03170

CALIBRATION OF A THERMAL ENRICHMENT MODEL FOR SHALLOW, BARRICADED ESTUARIES,
University of South Florida, St. Petersburg. Dept. of Marine Science.
K. L. Carder, S. L. Palmer, B. A. Rodgers, and P. J. Behrens.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 218, Price codes: A04 in paper copy, A01 in microfiche. Completion Report, September 1976. 61 p, 18 fig, 4 tab, 23 ref, 2 append. OWRT-5083 (4232) (1).

Descriptors: *Thermal pollution, *Model studies, *Computer models, Diffusion, Friction, Calibration, Measurements, *Florida, Thermal power, Heat exchange, *Estuaries, Path of pollutants, Water temperature, Distribution, Dispersion.
Identifiers: Barricaded estuary, Barotropic flow.

A new, semi-implicit, numerical model of thermal dispersion has been developed. It has been linked to an explicit, tidally driven hydraulics model of a barricaded estuary on the west coast of Florida. The model has been used to predict the distribution of temperature resulting from a seawater-cooled power generation facility near Crystal River, Florida. Manning numbers and diffusion coefficients have been determined for the modeled basin and verified by comparing characteristics of the calculated plume to those of the actual plume. Input variables included tidal height, power plant load, solar irradiance, air temperature, humidity, and pressure, and wind speed and direction. After five days of simulation for the period 6/15/75 to 6/19/75, the calculated plume area was within 15% of the measured acreage, and the calculated mean plume temperature differed from the measured value by only 0.05C.
W77-03171

IMMEDIATE INDUSTRIAL EFFECTS ON SEDIMENT MERCURY CONCENTRATIONS IN A CLEAN COASTAL ENVIRONMENT,
Florida State Univ., Tallhassee. Dept. of Oceanography.
G. A. Knauer.
Marine Pollution Bulletin, Vol. 7, No. 6, June 1976, p. 112-115, 3 tab, 1 fig, 14 ref.

Descriptors: *Mercury, *Heavy metals, Sediments, Mineral industry, *Nickel, Water quality, *Australia, *Water pollution, *Bottom sediments, Industrial wastes, *Water pollution sources, Industrial wastes.
Identifiers: *Sediment mercury concentrations, *Nickel refinery, Halifax Bay(Australia), Mercury content, Surface sediment concentration, Subsurface samples.

Studies were initiated in May 1975 to determine the impact of a new nickel refinery on ambient mercury level in sediments taken from Halifax Bay, Australia. Although mercury levels were relatively low in all samples, surface sediments were found to contain 2.5-3.0 times the mercury concentration of subsurface samples. However, surface sediment samples collected adjacent to the refinery outfall within the first three weeks of continuous discharge showed significant increases in mercury levels when compared with surface samples taken from areas not affected by the refinery. (Katz)
W77-03188

PELAGIC TAR IN THE NORWEGIAN COASTAL CURRENT,
Institute of Marine Research, Bergen (Norway).
G. B. Smith.
Marine Pollution Bulletin, Vol. 7, No. 4, April 1976, p. 70-72, 1 fig, 9 ref.

Descriptors: *Oil, *Oil spills, Oily water, Atlantic Ocean, *Path of pollutants, Ocean currents, Drifting(Aquatic) Water circulation, Transportation, Solid wastes, *Periphyton, *Oil wastes, *Plankton.
Identifiers: Gulf steam, Norwegian Coastal Current, *Pelagic tar, Norwegian Coast, Skagerrak, Barents Sea, North Sea, *Norway.

Petroleum particulates were found in 117 of 220 neuston samples collected in the Norwegian Coastal Current during March-August 1975, at an average concentration of 0.11 mg/m2. Highest concentrations were observed in the Skagerrak and Barents Sea. Lower densities occurred along the northwest Norwegian coast and in the North Sea. (Katz)
W77-03190

DISTRIBUTION AND SOURCE OF TAR ON THE PACIFIC OCEAN,
Department of the Environment, Victoria (British Columbia). Ocean Chemistry Div.
C. S. Wong, D. R. Green, and W. J. Cretney.
Marine Pollution Bulletin, Vol. 7, No. 6, June 1976, p. 102-105, 2 tab, 3 fig, 13 ref.

Descriptors: *Oil, Oil spills, Oily water, *Pacific Ocean, *Path of pollutants, *Ocean currents, Drifting(Aquatic), Water circulation, Transportation, *Ships, Water pollution, Solid wastes.
Identifiers: *Tar lumps, Northwest Pacific Ocean, Kuroshio current, Tanker tank washing.

Petroleum residues, or tar lumps, are concentrated in the northwestern portion of the Pacific Ocean, particularly in the Kuroshio current system. The source of the tar appears to be tank washings from tankers on the very large Middle East to Japan route. Tar pollutants apparently are discharged by tankers south of Japan, become entrained in the Kuroshio current, and create a plume of contamination which extends downstream for 7000 km across the Pacific. (Katz)
W77-03191

HEAVY METALS IN LAKES OF THE COEUR D'ALENE RIVER VALLEY, IDAHO,
Idaho Univ., Moscow. Dept. of Zoology.
S. B. Bauer.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 388, Price codes: A04 in paper copy, A01 in microfiche. Idaho Water Resources Research Institute, Moscow, November 1974. 55 p, 10 fig, 13 tab, 42 ref. (M.S. Thesis). OWRT C-4145(No. 9060)(1).

Descriptors: *Heavy metals, *Trace elements, *Mining wastes, *Idaho, Lakes, Lake sediments, Zinc, Copper, Cadmium, Lead, Antimony, Spectrophotmetry, Bass, Bullheads.
Identifiers: Coeur d'Alene Lake, Spokane River, Coeur d'Alene River, Swan Lake, Blue Lake, Thompson Lake, Killarney Lake, Anderson Lake, Black Lake, Medicine Lake, Cave Lake, Rose Lake, Bells Lake, Cesium.

Heavy metal concentrations were measured in the water, sediments, and fish of nine small lakes located along the main stem of the Coeur d'Alene River. Mining wastes have been discharged into this drainage since the 1890's. Concentrations of dissolved metals were low in the lakes and did not differ significantly from lake to lake. Zn, Cu, Cd, Pb, Cs and Sb have accumulated in lake sediments. The concentrations of these metals varied in sediments from lake to lake, and within each lake were highest at stations close to the river. Zn, Cu, and Cd concentrations in muscle and liver of Yellow Perch were not signigicantly different between lakes. However, Zn and Cd concentrations in fish from several of the Coeur d'Alene lakes were significantly higher than in fish from a control area. Metal concentrations were somewhat related to trophic status, decreasing at higher trophic levels. Zn, Cu, and Cd concentrations were greater in benthic insects than in fish. The concentration of zinc in muscle was highest in Brown Bullheads (68 mg/kg), an omnivorous species, and lowest in Largemouth Bass (20 mg/kg), a piscivorous species.
W77-03207

DISTRIBUTION OF LIGHT HYDROCARBONS C1-C14, IN THE NORTHEAST GULF O ALASKA AND THE SOUTHEASTERN BERIN SHELF,
National Oceanic and Atmospheric Administr tion, Seattle, Wash. Pacific Marine Environment Lab.
J. Cline, and R. Feely.
In: Environmental Assessment of the Alaska Continental Shelf. Principal Investigator's Repor for the Year Ending March 1976, Vol 9. Chemist and Microbiology, p 443-550, April 1976. 26 fig, tab, 24 ref, 2 append.

Descriptors: *Alaska, *Seepage, *Oil spills, *O pollution, *Water quality, *Water pollution e fects, *Baseline studies, *Environmental effect Sediments, Organic compounds, Path of poll tants, Distribution.
Identifiers: *Outer Continental Shelf, *Beri Sea, Oil exploration, Oil development, *Biogen sources, *Gulf of Alaska, Petroleum resource Crude oils, Lease areas.

The low molecular weight hydrocarbon progra was initiated in the OCS of Alaska in response the environmental guidelines set forth in the E vironmental Study Plan for the Gulf of Alask Southeastern Bering Sea and the Beaufort Sea The purpose was to establish the spatial and te poral variations (seasonal and diurnal) in the d solved hydrocarbon fraction composed methane, ethane, ethylene, propane, propyle isobutane and n-butane. These data are being c lected in order to establish baseline levels of na rally-occurring hydrocarbons in the lease are prior to exploration, development, and producti of fossil fuel reserves. These components ha proven to be valuable indicators of petroleu input arising from drilling, production, and tra portation of crude oil and refined products. In su port of the basic objectives, attention is be given to natural hydrocarbon sources, namely g and oil seeps, production of hydrocarbons fr near-surface sediments, and biogenic sourc within the euphotic zone. (Sinha-OEIS)
W77-03221

NATURAL DISTRIBUTION OF TRACE HEA METALS AND ENVIRONMENTA BACKGROUND IN THREE ALASKA SHE AREAS,
Alaska Univ., College. Inst. of Marine Science.
D. C. Burrell.
In: Environmental Assessment of the Alask Continental Shelf. Principal Investigators' Repo for the Year Ending March 1976, Vol 10. Chem try and Microbiology, p 1-145, April 1976. 16 f 38 tab, 57 ref. 03-5-022-56.

Descriptors: *Alaska, Pollutants, *Water quali *Heavy metals, *Trace elements, *Resour development, Water pollution sources, *Basel studies, Sediments, Chemical analysis, *Path pollutants, Distribution.
Identifiers: *Outer Continental Shelf, Oil explo tion, Oil development, *Petroleum resources, G of Alaska, Bering Sea, Beaufort Sea, Crude oils

Baseline sample collection of water and sedim for the Gulf of Alaska and Bering Sea has be completed and some biota samples taken fr these regions have also been received. Archiv sediment samples from the Beaufort Sea ha been analyzed, and a number of granulometric a clay mineralogy data for the surface sedim from all regions are included in this report. T contents of trace metals analyzed to date in water show no anomolous trends and are as l (or lower) as in other reported data sets for op ocean, uncontaminated regions. Mytilus a Fucus contents are, in general, lower than other reported coastal areas. From data in han would appear that the Alaskan OCS might well the present time, serve as a type example pristine coastal waters as far as heavy metal c tribution are concerned. (Sinha-OEIS)
W77-03222

YDROCARBONS: NATURAL DISTRIBUTION ND DYNAMICS ON THE ALASKAN OUTER ONTINENTAL SHELF,
aska Univ., College. Inst. of Marine Science.
G. Shaw.
: Environmental Assessment of the Alaskan ontinental Shelf. Principal Investigators' Reports r the Year Ending March 1976, Vol 10. Chemis- and Microbiology, p 193-366, April 1976. 11 f, 2 append. 03-5-022-56.

escriptors: *Alaska, Pollutants, *Water pollution urces, *Oil spills, *Seepage, *Oil pollution, Vater pollution effects, *Environmental effects, aseline studies, *Resources development, ota, Sediments, Suspended solids, *Organic mpounds.
entifiers: *Outer Continental Shelf, Seston, Gulf Alaska.

e objectives of this continuing work are to termine the kinds and amounts of hydrocarbons water, biota, sediment, and seston in the askan OCS environments and to determine the tent to which hydrocarbons are adsorbed by spended sediments of the Gulf of Alaska. These easurements provide the link between impacts, ch as the decline of a biological population, and spected causes of those impacts, such as the ad- ion of petroleum to the system. Based on work far completed, it appears that the levels of drocarbons in the Alaskan OCS environments e as low as, or lower than other areas of the orld ocean not subject to obvious petroleum pol- ion. The general goal of this project is to mea- re the ambient kinds and amounts of hydrocar- ns in various components of the Alaskan OCS vironment and to study key processes by which dded hydrocarbons are transported and degraded this environment. The primary focus has been e Gulf of Alaska. (Sinha-OEIS)
77-03224

ICROBIAL RELEASE OF SOLUBLE TRACE ETALS FROM OIL IMPACTED SEDIMENTS,
laska Univ., College. Inst. of Marine Science.
or primary bibliographic entry see Field 5C.
77-03225

ICIDENCE OF PATHOLOGY OF MARINE SH DISEASES IN THE GULF OF ALASKA, ERING SEA, AND BEAUFORT SEA,
alifornia Univ., Davis.
B. McCain, and S. R. Wellings.
: Environmental Assessment of the Alaskan ontinental Shelf. Principal Investigators' Reports r the Year Ending March 1976, Vol 10. Chemis- y and Microbiology, p 381-433, April 1976. 14 fig, ab, 50 ref.

escriptors: *Alaska, *Baseline studies, *Water uality, *Resources development, *Distribution tterns, *Oil pollution, *Fish diseases, Patholo- , Demersal fishes, Pollutant identification.
entifiers: *Outer Continental Shelf, Oil explora- n, Oil development, *Petroleum resources, Gulf Alaska, Bering Sea, Beaufort Sea.

e main purpose of this investigation was to ob- in baseline data on the present health status of mersal fishes in waters near Alaska's Outer ontinental Shelf so that future environmental ef- cts of oil exploration and development in these eas can be evaluated. The principal criterion of h health being employed is the frequency of ex- rnally visible pathological conditions. In addi- n, the histopathological and microbiological operties of each major disease are being charac- rized. The geographical areas included in this ork are the Bering and Beaufort Seas, and the ulf of Alaska. During September and October, 75, about 30,000 bottom-dwelling fish from the ering Sea were examined for diseases. The three ost commonly observed diseases and their equency of occurrence were: epidermal papil- mas of rock sole, 1.0%; lymphocystis of yellow- fin sole, 2.1%; and epidermal tumors of the pseu- dobranch of adult Pacific cod, 7.4%. Environmental factors, such as low salinity, higher temperature, suspended sediments, and other factors which affect natural disease resistance, are thought to influence the prevalence of the virus-caused lymphocysis lesions which has never before been reported to occur in marine fish on the northern Pacific coast of North America. (Sinha-OEIS)
W77-03226

DEVELOPMENT AND OPERATION OF HF CURRENT-MAPPING RADAR UNITS-PHYSICAL OCEANOGRAPHY,
National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
D. E. Barrick.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 11. Physical Oceanography and Meteorology, p 1-7, April 1976. 2 fig.

Descriptors: *Alaska, *Radar, *Ocean currents, *Water quality, *Baseline studies, *Resources development, *Water pollution sources, Coasts, Mapping.
Identifiers: *Outer Continental Shelf, *Physical oceanography, *Petroleum resources, Oil exploration, Oil development, Gulf of Alaska.

The primary objectives of the program are twofold: to implement a proven radar concept into a transportable, easily assembled and operated pair of units capable of producing a map of near-surface currents on location in real time, and to calibrate the system as to its accuracy; and to operate the radars at coastal areas of interest along the Gulf of Alaska seacoast in support of the OCSEAP objectives in physical oceanography. (Sinha-OEIS)
W77-03227

CURRENT MEASUREMENTS IN THE BEAUFORT SEA,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 2L.
W77-03228

NUMERICAL STUDIES OF ALASKAN REGION,
National Oceanic and Atmospheric Administration, Seattle, Wash. Pacific Marine Environmental Lab.
J. A. Galt.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 11. Physical Oceanography and Meteorology, p 107-211, April 1976. 29 fig, 5 tab, numerous ref, 3 append.

Descriptors: *Alaska, *Circulation, *Numerical analysis, *Oil spills, *Oil pollution, *Water pollution, *Baseline studies, *Resources development, Model studies, Mixing, Dispersion, Meanders, Leases.
Identifiers: *Outer Continental Shelf, Oil exploration, Oil development, *Petroleum resources, Oceanographic processes, Satellite imagery, Trajectory analysis, Regional flow, Hydrocarbons.

The numerical modeling and simulation studies are designed to provide information on advection and diffusion processes, aid in the interpretation of observational data, and present the results in an easy to interpret integrated form. This is to be done for as many of the OCS areas as time and data allow. Tools are being developed that can be applied in any region where the dynamics is appropriately represented and data for verification and boundary condition specification are available. To date, the modeling studies in cooperation with the rest of the physical oceanography program elements have been able to describe circulation patterns for some of the OCS region in considerable detail. In other areas, dominant physical processes have been identified and simulations have been initiated. From the results so far, it seems clear that these studies can integrate certain facets of the OCS program and present results that are a useful part of the assessment evaluation. Appendix I contains the text of an article, 'Circulation Studies on the Alaska Continental Shelf Off the Copper River Delta' - use of diagnostic model with time-dependent barotropic mode simulation to estimate trajectories. (Sinha-OEIS)
W77-03231

BRISTOL BAY OCEANOGRAPHIC PROCESSES (B-BOP),
National Oceanic and Atmospheric Administration, Seattle, Wash. Pacific Marine Environmental Lab.
J. D. Schumacher, and L. K. Coachman.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 11. Physical Oceanography and Meteorology, p 213-247, April 1976. 14 fig, 13 ref. R7120849.

Descriptors: *Alaska, *Ocean circulation, Pollutants, *Oil pollution, *Water pollution, *Resources development, *Baseline studies, *Environmental effects, Dispersion, Tides, Flow characteristics, Hazards.
Identifiers: *Outer Continental Shelf, *Petroleum resources, Oil exploration, Oil development, Oceanographic processes, *Bristol Bay.

The objective of this work unit was to relate oceanic advective and diffusive processes to potential pollution problems due to OCS petroleum development. From data collected, processed, and analyzed to date, the following conclusions have been made. The mean flow during fall 1975 in Bristol Bay was small (on the order of 1 cm/sec) and was directed toward the northwest flowing along the 50m depth contour; most of the variance energy was in tidal frequency bands; and major events in the flow regime occurred as pulses in the mean flow. This study has provided initial information on mean transport and an indication of the relative importance of dispersion in the Bristol Bay region. (Sinha-OEIS)
W77-03232

OUTER CONTINENTAL SHELF ENERGY PROGRAM,
National Oceanic and Atmospheric Administration, Miami, Fla. Atlantic Oceanographic and Meteorological Labs.
D. V. Hansen.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 11. Physical Oceanography and Meteorology, p 267-274, April 1976.

Descriptors: *Alaska, *Oil pollution, Pollutants, *Ocean currents, *Ocean circulation, *Resources development, *Water pollution sources, *Environmental effects, *Baseline studies, Dispersion, Hazards, Surface waters.
Identifiers: *Outer Continental Shelf, *Flow patterns, Oil development, Oil exploration, Gulf of Alaska, Hydrocarbons, Energy sources.

The general outline of this study is the acquisition of near surface flow trajectories throughout the entire N.E. Gulf of Alaska OCS region with particular emphasis on the lease area from Yakutat Bay to Prince William Sound. The device for acquiring this information is the NIMBUS-6 satellite and associated TWERLE/RAMS system. The development of improved diagnostic models allows prediction of pollutant trajectories based on the distribution of basic parameters. Also characteristic flow patterns are discernable allowing for

evaluation of petroleum development criteria based on projected pollutant impact zones. To date data shows that: near surface currents in the area are to the west as expected, and sustained speeds on the order of one knot are not unusual; there is indication of very strong topographic influence upon the flow in that current trajectories tend to parallel isobaths, and shoal areas appear to have a leed eddy structure, as might also be expected of islands, that may tend to retain pollutants; and surface pollutants released in the area off Yakutat Bay are likely to go ashore on or east of Kayak Island within two weeks. (Sinha-OEIS)
W77-03234

PREPARATION OF HYDRODYNAMICAL-NUMERICAL AND 3-PARAMETER SMALL-MESH ATMOSPHERIC MODELS FOR COASTAL WATERS IN THE GULF OF ALASKA,
Naval Environmental Prediction Research Facility, Monterey, Calif.
T. Laevastu.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigator's Reports for the Year Ending March 1976, Vol 11. Physical Oceanography and Meteorology, p 275-292, April 1976. 15 fig.

Descriptors: *Alaska, Pollutants, *Ocean currents, *Advection, *Diffusion, *Weather forecasting, *Water pollution, *Resources development, *Baseline studies, *Environmental effects, Coasts, Sea level, Organic compounds.
Identifiers: *Outer Continental Shelf, Oil exploration, Oil development, *Atmospheric models, Gulf of Alaska, Surface winds.

Three two-layer Hydrodynamical-Numerical (HN) models with overlapping boundaries have been programmed, covering the Alaskan coast of the Gulf of Alaska. The principal inputs of these models are tides (at the open boundaries), wind, 'permanent' (thermohaline) current and any release of pollutants. The principal outputs (either as time series at given locations, or as instantaneous area outputs at any given time) are currents, sea level and distribution of pollutants. The small-mesh meteorological model has been programmed to obtain detailed surface wind analyses/forecasts. It takes the boundary conditions from a 'standard' hemispheric analysis/forecast. Also available are spectroangular wave and surf forecasting models, though these were not part of this work unit. (Sinha-OEIS)
W77-03235

MESOSCALE CURRENTS AND WATER MASSES IN THE GULF OF ALASKA,
Alaska Univ., College. Inst. of Marine Science.
T. C. Royer.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 11. Physical Oceanography and Meteorology, p 293-358, April 1976. 11 fig, 8 ref, append. 03-5-022-56.

Descriptors: *Alaska, *Ocean circulation, *Oil pollution, *Ocean currents, Pollutants, *Upwelling, *Water pollution, *Baseline studies, *Environmental effects, *Resources development, Water quality, Sea level, Weather patterns, Storms, Tides, Diffusion, Dispersion.
Identifiers: *Outer Continental Shelf, *Petroleum resources, Oil development, Oil exploration, *Gulf of Alaska, Mesoscale currents, Water masses, Nearshore circulation, Seasonal variations.

The objectives of this study were to define the physical-chemical environment, transports of pollutants and the long-term monitoring of the physical-chemical environment in the Gulf of Alaska. It was concluded that there are variations in the scale lengths (and probably time scales) of the physical processes in the Gulf of Alaska. The shortest scale lengths were found northeast of Kodiak Island where very complex flows were seen. Another important conclusion is that nearshore surface water can be advected well offshore, as is apparently the case near Kayak Island. While the general flow is as expected, the perturbations on this flow have an important implication in the transport of pollutants. The temperature-salinity measurements show that the waters overlying the continental shelf in the northern Gulf of Alaska change on a seasonal basis. The causes of these changes are the input of heat and freshwater and variations in wind stress. Features in the vicinity of the shelf break and further offshore are semi-continuous around the gulf. The data indicate that the surface water inshore and eastward of Kayak Island moves southwestward and is located along the continental shelf break as it passes Kodiak Island. Apparently, there is a different surface water mass regime west of Kayak Island and inshore from Middleton Island. The changes in complexity of the horizontal structure of the water masses are evident from both the satellite and hydrographic data. These complexities disappear westward along the Alaska Stream. (Sinha-OEIS)
W77-03236

TRANSPORT OF POLLUTANTS IN THE VICINITY OF PRUDHOE BAY, ALASKA,
National Environmental Research Center, Corvallis, Oreg.
R. J. Callaway, and C. Koblinsky.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 11. Physical Oceanography and Meteorology, p 427-755, April 1976. Chiefly fig and tab. R-50813 and R-60813.

Descriptors: *Alaska, *Arctic Ocean, *Ocean circulation, *Oil pollution, *Water pollution, *Baseline studies, *Resources development, Environmental effects, *Pollutants, Tides, Flushing, Dispersion, *Path of pollutants.
Identifiers: *Outer Continental Shelf, *Petroleum resources, Oil exploration, Oil development, *Pollutant transport, Surface currents, Prudhoe Bay, Simpson Lagoon.

A set of computer runs has been made on a section of the Arctic Coast centered about Prudhoe Bay. Large scale model simulations were reproduced in two fine-grid models interior of the larger area: Prudhoe Bay and Simpson Lagoon. Limited verification of the large-scale model was planned but not completed because of the 1975 ice year. Tide records collected during 1975 inside Thetis and Stockton Islands provide the basis for tidal amplitudes used as input to the models. Additional required input data (bottom topography, winds, runoff) were obtained from USGS, NOS and other sources. The objectives of the study are to determine flushing rates, retention times and pollutant transport in the vicinity of Prudhoe Bay. For this purpose, a single-layer model of circulation was applied in order to compute tidal elevations and surface currents. Inferences were made from the computer output as to probable transport rates and pollutant dispersion. The objectives of the study relate to potential drilling operations in a limited section of the Arctic Coast. Additional inferences can be made as to the influence of marine operations on the environment and vice versa. (Sinha-OEIS)
W77-03238

MARINE CLIMATOLOGY OF THE GULF OF ALASKA AND THE BERING AND BEAUFORT SEAS,
Alaska Univ., Anchorage. Arctic Environmental Information and Data Center.
H. W. Searby.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 11. Physical Oceanography and Meteorology, p 757-769, April 1976. 7 fig. 03-5-022-56.

Descriptors: *Alaska, *Climatic data, *Oil spills, *Oil pollution, *Resources development, *Baseline studies, *Environmental effects, Climatology.
Identifiers: *Outer Continental Shelf, Oil exploration, Oil development, *Petroleum resources, *Gulf of Alaska, *Bering Sea, Beaufort Sea.

The objective of the project is to provide detailed marine and coastal climatology for input into the planning and operational phases of oil and gas development on the continental shelf. Specific objectives are to present information on temperature, precipitation, wind, and how they relate to such things as cloud cover, wave heights, and visibility (fog). Storm tracks and frequencies, storm surges and coastal flooding are being studied and will be part of the presentation. Such things as potential superstructure icing, tides, surface currents, immersion hypothermia and topography of both land and sea will also be included. Results for this project will be in the form of completed atlases, one each for the Gulf of Alaska, the Bering Sea, and the Beaufort Sea. (Sinha-OEIS)
W77-03239

MARINE CLIMATOLOGY OF THE GULF OF ALASKA AND THE BERING AND BEAUFORT SEAS. PART III. CLIMATIC ATLASES,
Alaska Univ., Anchorage. Arctic Environmental Information and Data Center.
H. W. Searby, and W. A. Brower, Jr.
In Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 11. Physical Oceanography and Meteorology, p 770-786, April 1976. 16 fig.

Descriptors: *Alaska, *Meteorological data, *Resources development, *Baseline studies, *Environmental effects, *Hazards, Coasts, Air temperature, Ocean waves, Oil spills, Oil pollution, Water pollution.
Identifiers: *Outer Continental Shelf, *Petroleum resources, Oil exploration, Oil development, *Climatic atlases, Marine climatoloty, Gulf of Alaska, Bering Sea, Beaufort Sea.

The investigation is to establish descriptive climatology and data analyses of marine and atmospheric parameters for the outer continental shelf waters of Alaska and determine if results have the necessary temporal and spatial resolution to provide an assessment of risks involved with operating energy related structures in the waters. The present study will provide three atlases to represent the total of the Alaskan waters and each will be based on more than 20 years of additional marine data. Also, as marine data are typically sparse in the near coastal zone, a zone of sharp gradients and complex climate, data for the coastal stations will be included. Such a combination should be the best possible climatological picture for the coastal waters of Alaska. The data processing is nearing completion. About 60% of the statistical graphs have been computed produced and plotting of parameter statistics for 360 charts in isopleth analysis begun. (Sinha-OEIS)
W77-03240

PHYSICAL OCEANOGRAPHY OF THE GULF OF ALASKA,
National Marine Fisheries Service, Seattle, Wash. Northwest Fisheries Center.
F. Favorite, and J. H. Johnson.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 11. Physical Oceanography and Meteorology, p 787-922, 61 fig, 61 ref.

Descriptors: *Alaska, *Ocean circulation, *Ocean currents, *Resources development, *Baseline studies, *Environmental effects, *Oil pollution, *Oil spill, Flow profiles, Oceanography.

ıtifiers: *Outer Continental Shelf, *Petroleum urces, Oil exploration, Oil development, w regime, *Gulf of Alaska, *Physical anography, Oceanographic data.

is a concise summary of the physical anography of the Gulf of Alaska with emphasis water circulation and transport. It provides kground information for OCSEAP field pro- ns and should assist in determining the location intensity of direct current measurements ired to define patterns in this highly complex regime thereby determining the potential ement of oil spills from offshore drill sites. ha-OEIS)
7-03241

AR-SHORE ATMOSPHERIC MODIFICA- N,
ional Oceanic and Atmospheric Administra- , Seattle, Wash. Pacific Marine Environmental

1. Reynolds, and B. Walter.
Environmental Assessment of the Alaskan tinental Shelf. Principal Investigators' Reports the Year Ending March 1976, Vol 11. Physical anography and Meteorology, p 923-992, April 5. 30 fig, 42 ref, append. R-7120848.

criptors: *Alaska, *Meteorological data, *Oil ution, *Water pollution, *Resources develop- t, *Baseline data, *Environmental effects, eorology, Winds, Coasts, Atmosphere.
ntifiers: *Outer Continental Shelf, *Petroleum urces, *Oil exploration, *Oil development, jectory analysis, Large scale flow, Planetary ndary layer.

ny near surface meteorological processes act to dify the surface winds in the coastal regions of ska. The modification is generally extensive ugh to seriously effect any attempts at relating optic weather maps to surface conditions. The anic water near the surface is strongly in- nced by the surface stress. As the wind makes ange in speed or direction, the water near the face is strongly affected almost immediately. n with time, the momentum change diffuses nward modifying the interior flow on a much er time scale. A thorough knowledge of coastal d conditions are an important consideration in shore industrial development through its ef- s both on mean flow and the trajectory of sur- e contaminants. The work is designed to define ch processes are acting to modify coastal ds, how prevalent they are, and how far off re they act. Shipboard measurements coupled h all available meteorological data have been ized in this goal. In addition, a study of com- er simulation of coastal meteorological condi- s has been undertaken to assess the applicabili- f a numerical model in making predictions of stal winds. (Sinha-OEIS)
7-03242

ASTAL MORPHOLOGY AND SEDIMENTA- ON, GULF COAST OF ALASKA (GLACIAL DIMENTATION),
ode Island Univ., Kingston, Dept. of Geology.
. Boothroyd, M. S. Cable, and R. A. Levey.
Environmental Assessment of the Alaskan tinental Shelf. Principal Investigators' Reports the Year Ending March 1976, Vol 12. Geology, 7-213, April 1976. 19 fig, 67 ref, 2 append. 03-5- -82.

scriptors: *Alaska, *Hazards, *Sedimentation, sources development, *Baseline studies, vironmental effects, *Water pollution, *Cold ons, Glacial sediments, Ice, Weather data, ps, Geologic investigations.
ntifiers: *Outer Continental Shelf, Oil develop- t, *Gulf of Alaska, Coastal morphology, re facilities, Braided outwash fans.

The major emphasis of the project was to evaluate present rates of change in coastal morphology, with particular emphasis on the possible impact of man-induced changes. Also the purpose of the study was to locate areas where the coastal environment is likely to be changed by man's activities and evaluate the effect of these changes, if any; and to evaluate effect of various geologic processes on man's activities in specific areas along the coast. The major information products included in this report are a series of large-scale maps and charts accompanied by photographs that illustrate specific features on those maps. The maps and charts are: Location map for the West Malaspina Foreland and Icy Bay area; Geologic hazards and processes map of the West Malaspina Foreland and Icy Bay area; Preliminary bathymetric chart of Icy Bay; and Environmental map of the east margin of Icy Bay. An appendix is included containing a table of weather data and drift-ice observations collected during the summer field season and a reprint of a paper (Boothroyd and Ashley, 1975) discussing outwash fan sedimentation on the northeast Gulf of Alaska, including Yana Stream on the West Malaspina Foreland. (Sinha-OEIS)
W77-03244

COASTAL DYNAMICS AND SEDIMENT TRANSPORTATION, NORTHEAST GULF OF ALASKA,
South Carolina Univ., Columbia. Dept. of Geology.
For primary bibliographic entry see Field 2L.
W77-03245

THE ENVIRONMENTAL GEOLOGY AND GEOMORPHOLOGY OF THE GULF OF ALASKA COASTAL PLAIN,
Alaska Univ., College. Dept. of Geology.
For primary bibliographic entry see Field 2L.
W77-03246

DISTRIBUTION, COMPOSITION AND TRANSPORT OF SUSPENDED PARTICULATE MATTER IN THE GULF OF ALASKA AND SOUTHEASTERN BERING SHELF,
National Oceanic and Atmospheric Administration, Seattle, Wash. Pacific Marine Environmental Lab.
For primary bibliographic entry see Field 2L.
W77-03248

OFFSHORE PERMAFROST STUDIES, BEAUFORT SEA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2L.
W77-03249

MARINE ENVIRONMENTAL PROBLEMS IN THE ICE COVERED BEAUFORT SEA SHELF AND COASTAL REGIONS,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2L.
W77-03250

SURFACE CURRENT OBSERVATIONS - BEAUFORT SEA, 1972,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2L.
W77-03251

DISTRIBUTION AND CHARACTER OF ICINGS IN NORTHEASTERN ALASKA,
Geological Survey, Menlo Park. Calif.
For primary bibliographic entry see Field 2C.
W77-03252

A 'HERRING-BONE' PATTERN OF POSSIBLE TAYLOR-GORTER-TYPE FLOW ORIGIN SEEN IN SONOGRAPHS,
Geological Survey, Menlo Park, Calif.
L. J. Toimil, and E. Reimnitz.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 12. Geology,p 626-640, April 1976. 4 fig, 15 ref.

Descriptors: *Alaska, *Flow characteristics, *Arctic Ocean, *Resources development, *Baseline studies, *Environmental effects, *Water pollution, Lagoon, *Sonar, Path of pollutants.
Identifiers: *Outer Continental Shelf, Oil exploration, Oil development, *Herring-bone patterns.

The potential usefulness of side-scan sonar in detailed studies of helical flow phenomena is indicated by records obtained within a shallow Arctic lagoon. The records reveal a 'herring-bone' like pattern of current aligned linear relectors with branching diagonals. Major longitudinal reflectors have no detectable relief and are believed to represent current-aligned, winnowed zones of the lagoon's silty fine sand. The winnowing processes are interpreted to occur along regions of helical cell divergence, suggesting a three-dimensional Taylor-Gorter flow origin. (Sinha-OEIS)
W77-03253

HEAVY-MINERAL TRENDS IN THE BEAUFORT SEA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2L.
W77-03254

YUKON DELTA COASTAL PROCESSES STUDY,
Wesleyan Univ., Middletown, Conn. Dept. of Earth and Environmental Sciences.
For primary bibliographic entry see Field 2L.
W77-03255

FAULT HISTORY OF THE PRIBILOF ISLAND AND ITS RELEVANCE TO BOTTOM STABILITY IN THE ST. GEORGE BASIN,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2L.
W77-03256

EARTHQUAKE ACTIVITY AND GROUND SHAKING IN AND ALONG THE EASTERN GULF OF ALASKA,
Geological Survey, Menlo Park, Calif. Office of Earthquake Studies.
For primary bibliographic entry see Field 2L.
W77-03257

EROSION AND DEPOSITION OF SHELF SEDIMENT: EASTERN GULF OF ALASKA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2L.
W77-03258

FAULTING AND INSTABILITY OF SHELF SEDIMENTS: EASTERN GULF OF ALASKA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2L.
W77-03259

SEISMIC AND VOLCANIC RISK STUDIES - WESTERN GULF OF ALASKA,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 2L.
W77-03260

OFFSHORE PERMAFROST-DRILLING, BOUNDARY CONDITIONS, PROPERTIES, PROCESSES AND MODELS,
Alaska, Univ., College. Geophysical Inst.
T. E. Osterkamp, and W. D. Harrison.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 13. Geology, p 138-256, April 1976. 15 fig, 1 ref, 5 append, chiefly data charts. 03-5-022-55.

Descriptors: *Alaska, *Permafrost, *Drilling samples, *Oil pollution, *Water pollution, *Environmental effects, *Resources development, *Baseline studies, Soil analysis.
Identifiers: *Outer Continental Shelf, Oil exploration, Oil development, *Prudhoe Bay, *Boundary conditions.

A subsea permafrost drilling program was carried out during late April and May 1975 at a site near the northwest side of Prudhoe Bay, Alaska. Two-meter thick fast ice was used as a drilling platform to drill into the seabed. This report describes the drilling and sampling procedures used. The techniques and results of the soil analysis, temperature measurements, salt concentration measurements, permeability measurements, and penetration tests are also given. Field drilling logs are included. (Sinha-OEIS)
W77-03261

BEAUFORT SEACOAST PERMAFROST STUDIES,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 2C.
W77-03262

FAULTING AND INSTABILITY OF SHELF SEDIMENTS - WESTERN GULF OF ALASKA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2L.
W77-03264

A HISTORICAL SUMMARY OF EARTHQUAKE EPICENTERS IN AND NEAR ALASKA,
National Geophysical and Solar-Terrestrial Data Center, Boulder, Colo.
For primary bibliographic entry see Field 7C.
W77-03265

A STUDY OF BEAUFORT SEA COASTAL EROSION - NORTHERN ALASKA,
For primary bibliographic entry see Field 2L.
W77-03266

DYNAMICS OF NEAR-SHORE ICE,
Cold Regions Research and Engineering Lab., Hanover, N. H.
For primary bibliographic entry see Field 2C.
W77-03268

MORPHOLOGY OF BERING NEAR SHORE ICE CONDITIONS BY MEANS OF SATELLITE AND AERIAL REMOTE SENSING,
Alaska Univ., College. OCS Coordination Office.
For primary bibliographic entry see Field 2C.
W77-03272

MORPHOLOGY OF BEAUFORT NEAR SHORE ICE CONDITIONS BY MEANS OF SATELLITE AND AERIAL REMOTE SENSING,
Alaska Univ., College. OCS Coordination Office.
For primary bibliographic entry see Field 2C.
W77-03273

EXPERIMENTAL MEASUREMENTS OF SEA ICE FAILURE STRESSES NEAR GROUNDED STRUCTURES,
Alaska Univ., College. OCS Coordination Office.
For primary bibliographic entry see Field 2C.
W77-03274

OPERATION OF AN ALASKAN FACILITY FOR APPLICATIONS OF REMOTE-SENSING DATA TO OCS STUDIES,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 7B.
W77-03277

THE COMPOSITION OF RAINWATER AT TWO SITES NEAR TOWNSVILLE, QLD. (AUSTRALIA),
Commonwealth Scientific and Industrial Research Organization, Townsville (Australia). Div. of Soils.
For primary bibliographic entry see Field 2K.
W77-03279

A STUDY OF THE SUSPENDED PARTICULATE PROBLEM IN THE DUWAMISH BASIN,
Boeing Co., Seattle, Wash.
For primary bibliographic entry see Field 5A.
W77-03291

BEAR RIVER EVALUATION REPORT, 1974 SURVEY,
Environmental Protection Agency, Seattle, Wash. Region X; and Environmental Protection Agency, Seattle, Wash. Surveillance and Analysis Div.
B. Schmidt, and K. Beck.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-247 650, Price codes: A08 in paper copy, A01 in microfiche. Report EPA-910/8-75-091, July 1975. 165 p, 4 fig, 7 ref, 3 append.

Descriptors: *Water quality, *Surveys, *Rivers, *Idaho, Sampling, Standards, *Water quality standards, Water pollution, Pollutants, *Pollutant identification, Water pollution sources, Biochemical oxygen demand, Coliforms, Pesticides, Heavy metals, Mercury, Turbidity, Hydrogen ion concentration, Dissolved oxygen, Water temperature, Nutrients, Bacteria, Watersheds(Basins), Water pollution control.
Identifiers: *Bear River Basin(Idaho).

The quality of the waters in the Bear River Basin was surveyed from August 27 to August 29, 1974. The purposes of the survey were to determine point and non-point source loading, to determine whether water quality has improved since the adoption of the 1958 Enforcement Conference pollution control measures, to determine the cause and effect relationships between major waste sources and receiving water quality, and to determine whether major waste sources are complying with their NPDES permits. Survey results showed violations of Idaho Water Quality Standards in these parameters: bacteria, turbidity, and dissolved oxygen. Also, level of Lindane, a chlorinated hydrocarbon pesticide, and mercury significantly higher than the recommended maximal levels were found in the upper reaches of the Bear River. Although sufficient data since 1958 were not available to evaluate the pollution control measures, water quality changes in BOD's and total coliform bacteria were noted. The Monsanto Company was found to comply with their NPDES permit in all but one area, there was an apparent temperature violation. Nutrient loading was investigated and related to algal productivity, but not all loading sources were located. Other findings included realization that point sources did not appreciably affect the quality of the Bear River except in very localized areas. (Sims-ISWS)
W77-03292

COMPUTER MAPPING OF WATER QUALITY IN SAGINAW BAY WITH LANDSAT DIGITAL DATA,
Bendix Aerospace Systems Div., Ann Arbor, Mich.
For primary bibliographic entry see Field 5A.
W77-03305

ALLATOONA LAKE, DESTRATIFICATION EQUIPMENT TEST REPORT.
Army Engineer District, Savannah, Ga.
For primary bibliographic entry see Field 5G.
W77-03306

ALLATOONA LAKE, DESTRATIFICATION EQUIPMENT TEST, APPENDIX A, OPERATIONAL AND WATER QUALITY DATA, 1968.
Army Engineer District, Savannah, Ga.
For primary bibliographic entry see Field 5G.
W77-03307

ALLATOONA LAKE, DESTRATIFICATION EQUIPMENT TEST, APPENDIX B, OPERATIONAL AND WATER QUALITY DATA, 1969.
Army Engineer District, Savannah, Ga.
For primary bibliographic entry see Field 5G.
W77-03308

ALLATOONA LAKE, DESTRATIFICATION EQUIPMENT TEST, APPENDIX C, OPERATIONAL AND WATER QUALITY DATA, 1970.
Army Engineer District, Savannah, Ga.
For primary bibliographic entry see Field 5G.
W77-03309

ALLATOONA LAKE, DESTRATIFICATION EQUIPMENT TEST, APPENDIX D, EFFECTS OF ARTIFICIAL DESTRATIFICATION ON TEMPERATURE AND DISSOLVED OXYGEN IN ALLATOONA RESERVOIR.
Associated Water and Air Resources Engineers Inc., Nashville, Tenn.
For primary bibliographic entry see Field 5G.
W77-03310

SALINITY INDUCED HORIZONTAL ESTUARINE CIRCULATION,
Texas A and M Univ., College Station, Dept. of Oceanography.
For primary bibliographic entry see Field 2L.
W77-03312

WATER QUALITY SIMULATION OF TAHOE TRUCKEE SYSTEM, NEVADA-CALIFORNIA VOLUME II - APPENDICES,
Nevada Univ., Reno. Center for Water Resources Research.
For primary bibliographic entry see Field 5A.
W77-03351

THE EFFECTS OF SEWAGE EFFLUENT ON WETLAND ECOSYSTEMS,
Michigan Univ., Ann Arbor.
For primary bibliographic entry see Field 5C.
W77-03354

RESIDUAL WASTE MANAGEMENT RESEARCH AND PLANNING PROJECTS, SEPTEMBER 1975,
Environmental Protection Agency, Washington D. C. Water Planning Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-250 954 Price codes: A15 in paper copy, A01 in microfiche Report No. EPA-440/9-76-003, September, 1975 363 p, 102 ref.

Descriptors: *Waste disposal, *Reclamation *Water pollution, *Social aspects, *Economics Governmental interrelations, Cost-benefit analysis, Sludge disposal, Regional development, Urbanization, Groundwater, Surface waters, Abstracts.

ximately 100 abstracts of documents dealing
ie subject of residual wastes and their im-
n ground and surface waters are presented.
bstracts provide project or publication
ication, a brief summary of the document,
tus of the project, information sources, and
ition details. The abstracts are arranged by
f residual wastes and are cross-referenced
necessary. Some basic topics covered in-
urban planning, regional planning, sludge
l, water pollution, material recovery, cost-
analysis, residual waste reclamation,
l waste disposal, and socio-economic and
vernmental aspectss of the impact of
l wastes. (Kreager-FIRL)
3355

SMENT OF OFFSHORE DUMPING IN
NEW YORK BIGHT, TECHNICAL
GROUND: PHYSICAL OCEANOG-
Y, GEOLOGICAL OCEANOGRAPHY,
HEMICAL OCEANOGRAPHY.
al Oceanic and Atmospheric Administra-
Miami, Fla. Atlantic Oceanographic and
rological Labs.
ble from the National Technical Informa-
rvice, Springfield, VA 22161 as COM-75-
Price codes: A05 in paper copy, A01 in
iche. Report No. ERL 332-MESA 3, R.L.
ll, editor. April, 1975. 92 p, 57 fig, 5 tab, 35

ptors: *Waste disposal, *Sewage sludge,
*Circulation, *Water pollution, Sludge
l, Water circulation, Solid wastes,
nts, Nitrates, Nitrites, Silicates,
ates, Organic compounds, Carbon, Sedi-
New York, Water sampling.
iers: Offshore dumping, *New York Bight,
nt distributions, Bight waters.

essment of the effects of offshore dumping
New York Bight is presented. Fine-grained
lumped in New York Bight is entrained in a
ise circulation pattern and is dispersed to
th. A significant portion is deposited in the
a immediately northwest of the dumpsites.
aensen Basin, a natural zone of mud deposi-
s significantly contaminated with sewage
Water sampling data show that nutrient
s, nitrites, silicates, and phosphates) dis-
ns are dominated by the lower New York
tflow, with dumped sewage sludge con-
g very small amounts. The car-
ate/total organic carbon ratio of samples
rom the bight indicates that the whole bight
s some sewage-derived materials, with the
t concentration occurring in the Hudson
/alley, the Christiaensen Basin, and north
geographical sewage sludge dumpsites.
gh the presence of sewage-derived material
ested by carbohydrate/total organic carbon
n sediments throughout the area close to
sland, low total organic carbon values
n all but isolated pockets demonstrate that
inant material comprises only a small frac-
the sediments. (Kreager-FIRL)
358

TIONS OF HEAVY METALS WITH
WITH SPECIAL REGARD TO THEIR
CATION IN SEWAGE WASTES,
rne Univ., Parkville (Australia). Dept. of
tural Chemistry.
eeper.
le from the National Technical Informa-
rvice, Springfield, VA 22161 as AD/A-019
ice codes: A05 in paper copy, A01 in
che. November, 1972. 77 p, 5 tab, 66 ref.
nent of the Army Contract No. DACW73-
26.

tors: *Heavy metals, *Soil chemical pro-
*Sewage, *Irrigation, *Plant growth,
ts, Metals, Sewage disposal, Toxicity,
n, Phosphorus.

Reactions of heavy metals with soils are reviewed, with particular emphasis on their application during the irrigation of crop lands with liquid sewage. Topics discussed include: the fate of heavy metals in soils, the mechanisms of removal of individual or grouped heavy metals, and the uptake and tolerance of heavy metals by plants. The use of specialists crops for harvesting unwanted accumulations of heavy metal does not appear to be feasible. As an alternative, the removal of metal-laden top soil is suggested so that the subsoil rich in nutrients from previous applications of nitrogen and phosphorus can be utilized. (Kreager-FIRL)
W77-03359

THE IMPACT OF FARGO, NORTH DAKOTA'S WASTE DISCHARGES ON THE INTERSTATE WATERS OF THE RED RIVER OF THE NORTH, SEPTEMBER 1969-APRIL 1970,
Federal Water Quality Administration, Kansas City, Mo.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-245 755, Price codes: A03 in paper copy, A01 in microfiche. July, 1970. 31 p, 4 fig, 8 tab.

Descriptors: *Water pollution, *Rivers, *Sewage treatment, *Treatment facilities, *Water pollution effects, Monitoring, On-site investigations, Dissolved oxygen, Biochemical oxygen demand, Suspended solids, Surface waters, North Dakota, Efficiencies, Performance, Waste treatment, Effluents, Bacteria, Organic compounds.

The impact of waste discharges from Fargo, North Dakota's sewage treatment plant on the Red River of the North was evaluated during field study conducted from September 1969 to April 1970. The total pounds of biochemical oxygen demand (5-day) discharged from the Fargo-Moorhead area during the survey period ranged from 4203/day in March to a high of 44,241/day in October. The quantity of wastes from Fargo steadily increased as the efficiency of the Fargo sewage treatment plant declined during the winter months, with Fargo contributing a maximum of 82% of the total organic waste load discharged from the Fargo-Moorhead area in March. The combined waste discharges from the Fargo-Moorhead area had an adverse effect on the water quality of the Red River of the North as evidenced by numerous violations of dissolved oxygen and bacterial criteria and violations of the state effluent requirements. Monthly averages of dissolved oxyen concentrations less than 5 milligrams/liter were observed for samples collected during the winter months. Monthly average effluent concentrations for samples taken from the Fargo sewage treatment plant always exceeded North Dakota's effluent criteria of 25 milligrams/liter biochemical oxygen demand and 30 milligrams/liter total suspended solids. (Kreager-FIRL)
W77-03361

REPORT ON POLLUTION IN LAS VEGAS WASH AND LAS VEGAS BAY.
Federal Water Pollution Control Administration, Cincinnati, Ohio. Div. of Technical Services.
For primary bibliographic entry see Field 5C.
W77-03371

EVALUATION OF LAKE MILNER WATER QUALITY MODEL,
Environmental Protection Agency, Seattle, Wash.
J. Yearsley.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-247 651, Price codes: A05 in paper copy, A01 in microfiche. Working Paper No. EPA 910/8-75-092, July 1975. 82 p. 29 fig, 18 tab, 14 ref.

Descriptors: *Dissolved oxygen, *Water pollution sources, *River flow, Mathematical models, Industrial wastes, Impoundments, Pollution abatement, Water quality, River basins, *Idaho.

Identifiers: *Snake River(Idaho), Minidoka Dam(Idaho), Milner Dam(Idaho), National Pollution Discharge Elimination System permits, Point source pollution, Non-point source pollution, *Lake Milner(Idaho).

Dissolved oxygen levels in the Milner reach of the Snake River, between Minidoka Dam and Milner Dam in southwestern Idaho, are influenced strongly by river hydrology and point source discharge of organic wastes. Non-controllable factors, including sediment demand, surface transfer and non-point source biological oxygen demand, are also important. The Milner reach had been classified as water quality limited, with extended periods of low dissolved oxygen and especially critical conditions during periods of low flow when discharges from municipal and industrial waste sources were at their peak. In 1974 National Pollutant Discharge Elimination System permits were drafted for two industrial waste sources in the Burley-Heyburn area, and the permit writing process was supported by mathematical modelling which showed that point source discharges would contribute measureably to the violation of dissolved oxygen standards even if the discharge satisfied appropriate existing guidelines. The purpose of the present survey was to provide data for validating the mathematical model and to assess ambient water quality during low flow. A compliance monitoring program for industrial and municipal waste sources in the area was designed to be conducted concurrently with the in-stream survey. (Harris-Wisconsin)
W77-03373

THE IMPACT OF A FOREST FIRE ON A WILDERNESS LAKE IN NORTHEASTERN MINNESOTA,
Minnesota Univ., Minneapolis. Limnological Research Center.
J. P. Bradbury, S. J. Tarapchak, J. C. B. Waddington, and R. F. Wright.
In: Verhandlungen Internationale Vereinigung Limnologie, Vol 19, Part II, p 875-883, 1975. 7 fig, 1 tab, 14 ref.

Descriptors: *Lakes, *Forest fires, *Minnesota, Forests, Nutrients, Runoff, Environmental effects, Phosphorus, Paleolimnology, Watersheds(Basins), Oligotrophy, Phytoplankton, Chemical analysis.
Identifiers: *Meander Lake(Minn), Dogfish Lake(Minn), Boundary Waters Canoe Area.

Possible forest fire induced limnologic changes are evaluated by comparing the post-fire hydrology, chemistry and phytoplankton biology of the nearly virgin-forested watershed of Meander Lake with that of the similar, unburned nearby Dogfish Lake, and by a detailed paleolimnologic analysis of a 60-cm core of Meander Lake surface sediments. The impact of the Little Sioux fire on the chemical and hydrologic processes was evaluated by comparing cation budgets. This comparison showed that runoff increased 60%, potassium and phosphorus exports increased 265% and 93% respectively, and calcium, magnesium, and sodium exports did not change significantly. Nutrient losses were less than observed elsewhere and there was no drastic increase in nitrate export. Increased phosphorus loading of Meander Lake was only 38% greater than that of Dogfish Lake, falling within the natural year-to-year variation. This increase did not have a pronounced effect on the standing crop of phytoplankton. Paleolimnologic analysis of sediment cores suggest that while logging activities before the fire may have had a real impact on the limnology of the lake, the fire had little impact despite the fact that it burned nearly 70% of the watershed. It is concluded that while the Little Sioux fire, a spring fire, may not be typical of late summer and fall fires, nutrient losses from it were minimal. (Luedtke-Wisconsin)
W77-03375

THE PRIMARY PRODUCTION OF LAKE SIBAYA, KWAZULU, SOUTH AFRICA,
For primary bibliographic entry see Field 5C.
W77-03376

LAKE PHOSPHORUS LOADING GRAPHS: AN ALTERNATIVE,
Environmental Protection Agency, Corvallis, Oreg. Eutrophication and Lake Restoration Branch.
For primary bibliographic entry see Field 5C.
W77-03377

WATER POLLUTION SURVEILLANCE IN THE UNITED STATES. REPORT NUMBER 1, MISSOURI RIVER MAIN STEM, 1958-1962.
Public Health Service, Washington, D. C. Water Quality Section.
For primary bibliographic entry see Field 5A.
W77-03379

WATER QUALITY IN THE CALUMET AREA. CONFERENCE ON POLLUTION OF LOWER LAKE MICHIGAN, CALUMET RIVER, GRAND CALUMET RIVER, LITTLE CALUMET RIVER, AND WOLF LAKE, ILLINOIS AND INDIANA.
Department of Health, Education, and Welfare, Washington, D.C. Technical Committee on Water Quality.
Available from the National Technical Information Service, Springfiel, VA 22161 as PB-245 377 , Price codes: A07 in paper copy, A01 in microfiche. September 1970. 140 p. 8 fig., 48 tab.

Descriptors: *Lake Michigan, *Water pollution sources, *Water quality standards, *Industrial wastes, Lakes, Streams, Rivers, Pollution abatement, Pollutants, Illinois, Indiana, Interstate rivers, Interstate commissions, Legal aspects, Water quality.
Identifiers: *Calumet River(Ill-Ind), Grand Calumet River, Little Calumet River, Wolf Lake(Ill-Ind).

Despite initiation of numerous pollution abatement measures in compliance with the Calumet Area Conference requirements stipulated at various meetings since 1965, not all water quality criteria have been met at all control points in the heavily-industrialized area and additional abatement measures are necessary. A review committee with an intergovernmental agency membership reports these water quality changes: (1) In open water there has been a deterioration of water quality in terms of threshold odor, oil and grease. Total phosphorus levels remain the same and other parameters show an improvement or no change. (2) In the inner harbor basin water quality has decreased because of grease and oil levels. Most other parameters, including total phosphorus, show little or no change. (3) No significant change is found in shore water. (4) Waters of the Grand Calumet River east to the Indiana Harbor Canal show improvement in most parameters. (5) Waters of the Grand Calumet River west to Illinois have deteriorated. (6) In the Little Calumet River west to Illinois, in Wolf Lake and in the Calumet River along the lake side of the O'Brien locks there has been no significant change except for bacterial water quality deterioration at Hammond Beach on Wolf Lake and a slight improvement at the mouth of the Calumet River. (Harris-Wisconsin)
W77-03382

POLLUTION OF INTERSTATE WATERS OF THE LOWER COLUMBIA RIVER BONNEVILLE DAM TO CATHLAMET, WASHINGTON.
Public Health Service, Portland, Oreg. Div. of Water Supply and Pollution Control.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-245 742, Price codes: A05 in paper copy, A01 in microfiche. August 1976. 85 p. 3 fig., 4 tab., 6 append.

Descriptors: *Pulp and paper industry, *Slime, *Fishing, *Columbia River, Pulp wastes, Saw mills, Wood wastes, Fibers(Plant), Water pollution sources, Organic wastes, Sulfite liquors, Commercial fishing, Sport fishing, Interstate rivers, Rivers, Nutrients, Pacific Northwest U.S., Biochemical oxygen demand.
Identifiers: Willamette River.

A summary report on pollution sources and effects along a 104-mile section of the lower Columbia shows that average daily biochemical oxygen demand (BOD) from pulp and paper mill waste loadings added to the river increased from 613,000 pounds in 1959 to 778,000 pounds in 1964. These wastes, nearly six times as great as those from all other sources combined, are primarily responsible for the development of abundant slime growths that flourish in the river and interfere with commercial and sport fishing by fouling nets and gear. Wood and fibers, moreover, add strength and body to the slimes and make them more difficult to remove from the equipment. The mills from Camas to Longview discharge these fibers along with dissolved organic wastes. Fiber decomposition is so slow that with existing river flows the increment of fibers from each successive waste discharge increases the downstream concentration. Slime is especially troublesome when river flow rates are less than 220,000 cubic feet per second and the water temperature 10-15 degrees centigrade. Pulp and paper mills should design and build mechanically-cleaned primary treatment facilities for mill wastes. Next, BOD loadings derived from spent sulfite liquor discharged by the industry at Camas and Vancouver should be reduced, and liquor solids should no longer be barged to the Columbia from its tributaries. (Harris-Wisconsin)
W77-03385

AQUATIC FIELD SURVEY AT IOWA ARMY AMMUNITION PLANT,
Environmental Control Technology Corp., Ann Arbor, Mich.
For primary bibliographic entry see Field 5C.
W77-03386

BREAKUP FLOODING AND NUTRIENT SOURCE OF COLVILLE RIVER DELTA DURING 1973,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
R. A. Hamilton, C. L. Ho, and H. J. Walker.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A009 551, Price codes: A02 in paper copy, A01 in microfiche. In: The Coast and Shelf of the Beaufort Sea; J. C. Reed and J. E. Sater (eds.), The Arctic Institute of North America, Arlington, Va. 1974; p. 637-648. (Reprinted as Technical Report No 188, ADA009551, June 1975. 7 fig, 2 tab, 8 ref).

Descriptors: *Ice breakup, *Nutrients, Seasonal, Vertical migration, Arctic Ocean, Ice-water interfaces, Sea ice, Rivers, Permafrost, Tundra, *Alaska, Cold regions, Estuaries, Inorganic compounds, Phytoplankton, Annual flood, Deltas.
Identifiers: *Colville River delta(Alaska), Beaufort Sea.

Spring breakup flooding of the Colville River in northern Alaska plays a significant role in raising the inorganic nitrogen level and the ratio of inorganic nitrogen to phosphate to a more nutrient-balanced state for phytoplankton assimilation in the nearshore waters of the Beaufort Sea area of the Arctic Ocean. The Colville is similar to rivers in other climactic regions characterized by pronounced seasonal variation in that it has distinct periods in its annual hydrologic cycle. The Colville ceases to flow during much of the winter. During breakup in early June, its floodwater moves seaward beneath the sea ice but above the sea water. Comparisons of analyses made of vertical offshore variations show no significant variation in nutrient concentration during the wint
But with the breakup, vertical variations beco
pronounced. The freshwater layer showed mic
gram levels per liter for various inorganic nutrie
to be 50% to 300% greater than the levels obtai
from the seawater specimens. With the onset
winter, seawater penetrates upstream beneath
ice and becomes dominant in all channels c
nected with the coastal waters. Melt water usu
appears in the latter part of May. When it reac
sufficient depth, it flows downstream to the sea
top of the bottom fast ice and beneath the floa
ice cover. The flow flushes sea water from
channels within two or three days. (Har
Wisconsin)
W77-03388

DEGRADATION MECHANISMS: C
TROLLING THE BIOACCUMULATION
HAZARDOUS MATERIALS,
National Environmental Research Center, Cin
nati, Ohio. Solid and Hazardous Waste Rese
Lab.
C. J. Rogers, and R. E. Landreth.
Available from the National Technical Infor
tion Service, Springfield, VA 22161 as PB-240
Price codes: A02 in paper copy, A01 in microfi
Report No. EPA-670/2-75-005, January 1975.
3 fig, 1 tab, 18 ref. 1DB311; ROAP 07ADZ;
10.

Descriptors: *Biodegradation, Path of pollut
Pesticides, Toxicity, Agricultural chemicals,
dustrial wastes, Chemical wastes, Metaboli
Persistence, Degradation(Decomposition),
vironmental effects, Enzymes, Toxins.
Identifiers: *Bioaccumulation, *Hazard
materials, Photodegradation.

Mechanisms which transform toxic or hazard
substances, generated for commercial, indus
and agricultural uses into other toxically-ac
and inactive compounds, are delineated. Meth
to minimize the release of unwanted chemi
into the environment are also described. Hydr
sis, oxidation, reduction, dealkylation, desulf
tion and dehalogenation play an important ro
the biotransformation of organochlorine,
ganophosphorus and carbamate insecticides i
sects. Some of these basic enzymatic reactio
pesticide metabolism are illustrated. Mechani
for the metabolic transformation of pesticides
taining aromatic structures are also gi
Parathion, methyl parathion, DDT, dieldrin,
D, MCPA, silvex, fenac, dalapon, atriazine
DCPA are metabolized both by the target or
isms at which they are directed and by man
other nontarget species. Photodegradation
natural process by which compounds such as
are transormed into a product as toxic or
toxic than the parent chemical. Bioaccumula
of chemials such as heavy metals and chlori
hydrocarbons in living cells was also repo
Technology alternatives to reduce the impac
these materials include the concentration pro
utilizing reverse osmosis, ion exchange, activ
carbon adsorption and impoundment techniq
and the detodicication process utilizing che
oxidation/reduction, catalytic, and subs
tion/transformation techniques. (Luedtke-Wi
sin)
W77-03391

ELEMENTAL DISTRIBUTION DIAGRAMS
BIOLOGICAL WASTEWATER TREATMEN
Virginia Polytechnic Inst. and State U
Blacksburg. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W77-03429

THE APPLICATION OF THE FOAM FR
TIONATION PROCESS TO THE REMOVAL
VIRUSES. PART I. THE PRODUCTION O

HEMATICAL MODEL TO PREDICT THE CIENCY OF VIRUS REMOVAL,
Polytechnic, Nottingham (England). Dept. e Sciences.
rimary bibliographic entry see Field 5D.
03433

HEMICAL MECHANISMS IN THE HANE FERMENTATION OF GLUTAMIC OLEIC ACIDS,
Seifert and Jost, Englewood Cliffs, N. J.
rimary bibliographic entry see Field 5D.
03441

UDY OF MIXING CHARACTERISTICS OF AGE STABILIZATION PONDS WITH OACTIVE TRACERS,
ngham Univ., (England), Dept. of Civil En- ring.
rimary bibliographic entry see Field 5D.
03461

ATE MONITORING.
rimary bibliographic entry see Field 5A.
03468

STIGATION OF OXYGEN TRANSFER TO E AS A SURFACE REACTION,
o Univ., Ohio. Dept. of Chemical Engineer-

Lee, K. J. De Witt, G. F. Bennett, and J. L. ewell.
r Research, Vol. 10, No. 11, p 1011-1017, 2 fig, 3 tab, 15 ref.

iptors: *Sewerage, *Analytical techniques, en, *Slime, Surfaces, Nutrients, Laminar Tubes.
ifiers: *Oxygen transfer.

xygen, nutrient-laden water flow in steady ar motion in a circular tube whose inner sur- is covered with a thin layer of microorgan- was used to determine oxygen transfer to Dissolved oxygen diffuses to the slime-fluid ace and is consumed in a reaction of arbitra- netic dependence on oxygen concentration. irst part of each experiment investigated the h of the slime and the attainment of steady in overall oxygen utilization. The second part o determine if the flow-averaged oxygen con- ation of the reactor effluent was a function of length. Controlling factors of oxygen utiliza- ates are the rate at which oxygen diffuses gh the inert surrounding material to the organisms and the kinetics of reaction of the n in biochemical reactions. Aerobic utiliza- f dissolved organic matter by a slime film de- on the availability of oxygen to act as a final on acceptor in the final biochemical reac- The second part of the experiment indicated he oxygen-microorganism reaction was zero It is concluded that in a continuous flow, y state system, reaction kinetics between dis- d oxygen and the attached thin layer of organisms generated by raw sewage do not d on the dissolved oxygen concentration. ns-FIRL)
03476

COLYSIS OF 5-CHLOROURACIL IN URAL WATERS,
Ridge National Lab., Tenn. Environmental ces Div.
Southworth, and C. S. Gehrs.
Research, Vol. 10, No. 11, p 967-971, 1976. 20 ref.

iptors: *Pollutant identification, Water *Stability, *Chemical reactions, *Aqueous ons, Ultraviolet radiation, Solar radiation, ics.
fiers: *Photolysis, *Chlorouracil.

Investigations were made of the stability of 5-chlorouracil in dilute aqueous solution when exposed to UV radiation equal to sunlight and to determine the rate and mechanism of the photolysis process. Photolytic reduction of 5-chlorouracil concentrations in natural waters vary with seasonal changes in the aquatic environment. Absorption of UV radiation by dissolved organic matter makes photolysis insignificant at depths greater than 1 m. A decrease in photolysis occurs during winter with low light and temperature, due to the lower pH associated with less photosynthetic activity, and due to lower incident UV levels and the shift in threshold photolysis pH with lower temperatures. Acidic conditions also inhibited photolysis during any combination of temperature and illumination. Photolytic decomposition of 5-chlorouracil is most significant in relatively shallow, clear, alkaline water bodies and less in acidic, colored, or turbid waters. It was suggested that the photolysis reaction observed was basically photohydrolysis. Though natural sunlight-induced photolysis reduces 5-chlorouracil concentrations added to natural waters by chlorination, usually the rate is not fast enough to significantly reduce the quantity added to the environment. Therefore, sunlight UV radiation cannot be counted upon to reduce environmental consequences of the introduction of 5-chlorouracil into natural waters. (Collins-FIRL)
W77-03477

TRANSFERABLE DRUG RESISTANCE ASSOCIATED WITH COLIFORMS ISOLATED FROM HOSPITAL AND DOMESTIC SEWAGE,
Florida Univ., Gainesville. Dept. of Environmental Engineering Sciences.
For primary bibliographic entry see Field 5A.
W77-03478

A STUDY OF SUBSTRATE REMOVAL IN A MICROBIAL FILM REACTOR,
Cape Town Univ. (South Africa). Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5D.
W77-03480

HYGIENIC STANDARDIZATION OF THE CONTENT IN WATER OF MONOISOBUTYLAMINE AND DIISOBUTYLAMINE DURING THEIR COMBINED ACTION, (IN RUSSIAN),
Sanitarno-Gigienicheskii Meditsinskii Institut, Leningrad (USSR).
M. N. Kuklina, and S. A. Zyabbarova.
Gig Sanit 4, p 39-41, 1975.

Descriptors: *Organic compounds, Public health, Organic wastes, Water quality standards, Reactions, Lethal limit.
Identifiers: *Butylamines.

The combined action of mono- and diisobutylamine, which have the same limiting index of noxiousness, consists of a simple summation of the effect. (Experiments were conducted on rats and rabbits.) When jointly present in a water body, their content should not excees 1/2 of the maximum permissible concentration. The simultaneous presence of mono- and diisobutylamine at this level does not cause a deterioration of the organoleptic properties of water, disturb natural purification processes nor have any toxic action. (The dynamics of saprophytic microflora were also studied.)--Copyright 1976, Biological Abstracts, Inc.
W77-03481

AEROSOL PRODUCTION BY IRRIGATION EQUIPMENT USED FOR LAND APPLICATION OF WASTE WATER,
Brookhaven National Lab., Upton, N. Y.
For primary bibliographic entry see Field 5A.
W77-03484

VARIATIONS OF COLIFORM BACTERIA AND OTHER POLLUTION INDICES IN SURFACE WATERS.
Public Health Service, Washington, D.C. Water Quality Section.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-250 541, Price codes: A02 in paper copy, A01 in microfiche. April 1965. 17 p, 5 fig, 2 ref.

Descriptors: *Waste water treatment, *Sedimentation rates, *Coliforms, *Suspended solids, Flocculation, Coagulation, Sewage bacteria, Effluents, Sedimentation, Suspended load, Waste disposal, Detergents, Phosphates, Nitrogen, Nutrients, Surface waters, New York, California.
Identifiers: *New York Harbor, Primary effluents, Secondary effluents, Differential sedimentation.

A 10% annual increase in coliform pollution in New York Harbor waters since the early 1950's--a period marked by continuing sewage treatment plant construction in the area--may have been a direct result of the improved treatment practice, as suggested by comparisons with data from other sources. Blame for the bacterial pollution was first assigned to an 'aftergrowth' of organisms in the receiving waters stimulated by nutrients such as phosphate or nitrogen compounds in secondary treatment effluent. But studies of marked coliform increases at five inland locations with improved waste treatment programs of relatively recent origin show that phosphate, detergent and other pollution parameters do not clearly correlate with coliform increases. However, examination of Los Angeles' Hyperion Treatment Plant and its effects on the waters of Santa Monica Bay suggest that New York Harbor's coliform problem is due to the changed behavior of suspended solids in the effluents. At Santa Monica Bay, suspended solids in primary effluent settled with a rate coefficient four times that for secondary effluent, and the coliforms associated with the solids were, of course, similarly affected. Analysis of this settling proclivity differential shows that such coliform increases may be expected when improved treatment, but not effluent chlorination, is provided. (Harris-Wisconsin)
W77-03539

SIMULATION OF PESTICIDE MOVEMENT ON SMALL AGRICULTURAL WATERSHEDS,
ESL, Inc., Sunnyvale, Calif.
R. T. Adams, and F. M. Kurisu.
Report No EPA-600/3-76-066, Ecological Research Series, September 1976. 342 p, 138 fig, 14 tab, 65 ref, 3 append. 68-01-0721, 68-01-2977.

Descriptors: *Path of pollutants, *Pesticide kinetics, *Soil physical properties, *Simulation analysis, Pesticides, Pesticide residues, Movement, Infiltration, Percolation, Volatility, Leaching, Adsorption, Persistence, Runoff, Evaporation, Soil profiles, Agriculture, Model studies, Degradation, *Agricultural watersheds, Mathematical models, Computer models.
Identifiers: *SCRAM, Sensitivity analysis.

A computer model, SCRAM, (Simulation of Contaminant Reactions and Movement) designed to predict the movement of pesticides from agricultural lands, is described and its predictive capability tested. SCRAM is composed of a number of deterministic submodels which describe infiltration, percolation, evaporation, runoff, sediment loss, pesticide adsorption and desorption in the soil profile, pesticide microbial degradation in the soil profile, and pesticide volatilization processes. SCRAM predictions of these physical processes were compared to experimental data from two small watersheds near Athens, Georgia. Simulation of surface runoff agreed reasonably well with experimental measurements, while sediment loss predictions did not. Predictions of pesticide loss in the runoff and on the sediment were in general

agreement with experimental data, after allowing for inaccurate sediment loss predictions. Tests of the model for pesticide movement in the soil profile indicated: (1) that some diphenamid was transported more rapidly below 5 centimeters, remained longer in the upper 5 centimeters, and degraded similarly to the experimental results; (2) initial atrazine movement into the soil was more rapid than predicted and its degradation was not in agreement; (3) simulated rates of pesticide removal from the soil surface was too rapid; and (4) simulated trifluralin volatilization losses were somewhat unsatisfactory, while its movement in the soil profile was in close agreement with experimental measurements. (Luedtke-Wisconsin)
W77-03540

SIGNIFICANCE OF NITRATES IN DRINKING WATER, (IN RUSSIAN),
Belorussian Sanitary-Hygienic Research Inst., Minsk (USSR).
L. L. Livshits, A. G. Kokina, and G. I. Lazyuk.
Gig Sanit 5, p 103 104, 1975.

Descriptors: *Nitrates, *Potable water, *Water wells, Artesian wells, Water analysis, Water pollution, Cities, Groundwater, *Nitrogen, Soils, Rural areas.
Identifiers: *Belorussian-Ssr, *USSR, Nitrate nitrogen, *Neonates.

The data of many investigators indicate the occurrence of methemoglobinemia in connection with the consumption of drinking water containing nitrates in quantities exceeding 10 mgN/1. An investigation of 1098 artesian and dug wells in all regions of the Belorussian SSR (USSR) revealed that the water of 80.27% of the wells contained nitrates in a quantity > 10 mg N/1. There was an inverse relation between the nitrate concentration and depth of the wells and a direct relation between the nitrate content in the well water and amount of precipitation, which indicated that the nitrate concentration in well water reflects the effect of the degree of soil pollution of the investigated rural areas. A study of 27,383 histories of urban and rural neonates did not reveal significant differences in the proportion of neonates with congenital defects of fetal development among rural inhabitants in comparison with urban. A comparison of the number of term neonates with a relatively low weight (up to 3.5 kg) in urban and rural locales did not reveal significant differences. A high content of nitrate N in groundwaters is not considered one of the factors promoting fetal antenatal hypotrophy.--Copyright 1976, Biological Abstracts, Inc.
W77-03541

A MODEL FOR THE CONTROL OF DISSOLVED MANGANESE IN THE INTERSTITIAL WATERS OF CHESAPEAKE BAY,
Johns Hopkins Univ., Baltimore, Md. Dept. of Earth and Planetary Sciences.
G. R. Holdren, O. P. Bricker, and G. Matisoff.
Available from the National Technical Information Service, Springfield, VA 22161 as COO-327 919, Price codes: A02 in paper copy, A01 in microfiche. Report CONF-750410-8, (1975). 18 p. 6 fig., 1 tab., 33 ref. AEC AT(11-1)-3292.

Descriptors: *Chesapeake Bay, *Model studies, *Manganese, *Pore water, Inlets(Waterways), Estuaries, Interstices, Subsurface waters, Chemical properties, Ionization, Acidity, Sediments, Bottom sediments, Diagenesis, Path of pollutants, Distribution.
Identifiers: *Dissolved manganese.

A model is described which predicts dissolved manganese distribution in the anoxic pore waters of the sediments of Chesapeake Bay, where greater concentrations of the metal have been found than in any other marine or brackish water sediment system. The model was developed from observations on the pore water composition and describes the results of two independent competing reactions. Both reactions are continuous over the whole sediment column, and the final calculated concentration of dissolved manganese at any particular depth is dictated by the process most limiting the concentration at that depth. The model requires knowledge of the acidity of the pore waters, the distribution of bicarbonate ion with depth in the sediment, the amount of manganese oxide in the surface sediment and the rate of release of manganous ion from those solids. In the model, the diffution coefficient and sedimentation rates were assumed as constant through space and time, respectively, and it was assumed that steady state has been reached in the system and that with depth in the core manganous ion was in equilibrium with a poorly-crystalline carbonate phase. Agreement is generally good between the model and the field data, suggesting that the processes controlling the distribution of dissolved manganese in the bay sediments are basically understood. (Harris-Wisconsin)
W77-03556

THE IMPACT OF INTENSIVE APPLICATION OF PESTICIDES AND FERTILIZERS ON UNDERGROUND WATER RECHARGE AREAS WHICH MAY CONTRIBUTE TO DRINKING WATER PROBLEMS,
Environmental Protection Agency, Washington, D.C. Office of Toxic Substances.
D. Garrett, F. P. Maxey, and H. Katz
Available from the National Technical Information Service, Springfield, VA 22161 as PB-251 181. Price codes: A06 in paper copy, A01 in microfiche. January, 1976. 110 p, 12 fig, 6 tab, 103 ref. Technical Report No. EPA 560/3-75-006.

Descriptors: *Water pollution, *Groundwater recharge, *Farms, *Fertilizers, *Pesticides, Waste disposal, Septic tanks, Cesspools, Soil types, Soil water movement, Potable water, Groundwater, Nitrates, Nitrification, Denitrification, Chemical wastes, Farm wastes, Nitrogen compounds, Path of pollutants.

An assessment of the impact of intensive application of pesticides and fertilizers on underground water recharge areas is presented, with particular emphasis on agricultural feedlot operations. Pesticides appear to offer only a marginal threat to groundwater quality because of their adsorptive properties in the soil structure and/or their short-lived persistence. Exceptions to this include the improper application of pesticides or the existence of sandy soils or thin soils overlaying fissured rocks. With regard to fertilizer application, more information on the amount of nitrate reaching the groundwater is required. Septic tanks on farms present an insignificant source of pollution to groundwater in terms of public drinking water supplies. However, well water supplies on a particular farm may be susceptible to contamination from septic tanks. Cesspools represent a significantly greater groundwater pollution source, although such installations are now widely prohibited. More information on the processes of nitrification and denitrification in various soils and subsoils as a function of soil temperature, climate, and biochemistry is needed in relation to animal waste applications and fertilizer and crop cover sources of nitrogen. (Kreager-FIRL)
W77-03567

EXPERIMENTAL SUBSTANTIATION OF THE MAXIMAL PERMISSIBLE CONCENTRATIONS OF TRIETHANOLAMINE, AMMONIUM AND CALCIUM SALTS OF ALKYLBENZOSULFATES IN WATER BODIES, (IN RUSSIAN),
Nauchno-Issledovatelskii Institut Epidemiologii i Mikrobiologii, Lvov (USSR).
V. Y. Kordonets.
Gig Sanit 3, p 22-25, 1975.

Descriptors: *Organic compounds, Organolep properties, *Lethal limit, *Water quality st dards, Water pollution, Chemical wastes, Sal Toxicity, Calcium, Ammonium.
Identifiers: *Alkylbenzolsulfates, Calcium sal Ammonium salts, *Ethanolamine.

Triethanolamine, ammonium and calcium salts alkylbenzolsulfonic acids have unfavorable fects on the organoleptic properties of water the sanitary regimen of water bodies. The co pounds are of low toxicity, their cumulative p perties are insignificant and they have a polytro effect on warm-blooded animals. The no toxic levels of triethanolamine, ammonium and calci salts of alkylbenzosulfates in the water compr 1, 0.8 and 0.2 mg/l, respectively. Rats and m were studied.--Copyright 1976, Biological A stracts, Inc.
W77-03586

5C. Effects Of Pollution

DISTRIBUTION OF PELAGIC ZOOPLANKT WITHIN A THERMAL GRADIENT IN LA COLUMBIA, A COOLING LAKE NE PORTAGE, WISCONSIN,
Wisconsin Univ., Madison. Lab., of Limnology
R M Villwock
Available from the National Technical Inform tion Service, Springfield, VA 22161 as PB-262 2 Price codes: A03 in paper copy, A01 in microfic Honors Degree Report for B.A. in Zoology, M 1976. 44 p, 9 fig, 4 tab, 13 ref. OWRT A-0 WIS(2). 14-34-0001-6052.

Descriptors: Spatial distribution, *Thermal po tion, *Cooling water, Management, *Trop level, Biological communities, *Wiscons *Zooplankton, *Distribution, *Thermal prop ties, Lakes, Water pollution effects.
Identifiers: *Lake Columbia(Wisc), Lake W gra(Wisc), *Pelagic zooplankton, Cooling lak Vertical distribution.

Zooplankton samples showed that pela zooplankton were non-randomly distributed both the vertical and horizontal planes of L Columbia, Wisconsin. These distributions a function of temperature within a thermal gradi are described. Lake Columbia is an artificial, hectare (480 acre), U-shaped cooling lake wh waters undergo a 10 to 15 degree centigrade t perature increase when pumped as coo through a 527 megawatt fossil fuel power plant comparison of seasonal abundance data zooplankton species of Lake Columbia with same species of Lake Wingra, a suitable refere lake also in southern Wisconsin, indicated that Lake Columbia zooplankton seasonal abunda was altered by the thermal environment. L Columbia experienced temperatures in excess 44 degrees centigrade in mid-summer months; ing these months zooplankton were rare or abs Lake Wingra data do not contain any summer t peratures exceeding 30 degrees centigrade nor total zooplankton population levels of less tha to 20 organisms per liter. Lake Colum zooplankton levels were highest in November plant outfall counts of 600 organisms per liter trainment concentrated zooplankton at the p outfall and at the outfall of the pumping sys which maintains lake level. Vertical distributio zooplankton were affected more by nega phototropism and wind mixing of Lake Colum than by thermal stratification.
W77-03077

DISTRIBUTION AND FEEDING OF PUMPK SEED (LEPOMIS GIBBOSUS) AND BLA CRAPPIE (POMOXIS NIGROMACULATUS) A POWER PLANT COOLING LAKE,
Wisconsin Univ., Madison. Lab. of Limnology
G. Kromrey.

lable from the National Technical Informa- Service, Springfield, VA 22161 as PB-262 219, e codes: A03 in paper copy, A01 in microfiche. Thesis, May 25, 1976. 19 p., 11 tab, 11 fig, 13 OWRT A-070-WIS(1). 14-31-0001-6052.

riptors: *Water cooling, Management, Lim- gy, Biological properties, Biological commu- s, Ecosystems, *Distribution, *Thermal pollu- *Thermal properties, Fish diets, Fish vior, Fish food organisms, *Sunfishes, es, *Wisconsin, Water pollution effects. ifiers: *Lake Columbia(Wisc), *Black crap- *Pumpkinseed(Fish).

distribution, feeding, movements, and condi- of pumpkinseeds (Lepomis gibbosus) and k crappie (Pomoxis nigromaculatus) along the ontal thermal gradient of Lake Columbia examined during the autumn of 1975. Dis- tion and condition data were obtained by cap- g fish with fyke nets stratified by tempera- Fish feeding habits were determined by ach content analysis. Evidence of fish move- was sought by comparing known macroin- brate and zooplankton distributions to fish ach analysis. Results indicate that the fish not aggregating at their preferred tempera- Small black crappie ate macroinvertebrates, ly chironomids and Coenis, and zooplankton. e black crappie ate Lepomis juveniles and oinvertebrates. Pumpkinseeds ate mostly nomids and some Caenis and zooplankton. food of the fishes corresponded to the differ- elative abundances of food organisms moni- l in the vicinity of a particular catch point, in- ing that fish on a daily basis were not ming extensive linear distances. Both species in above average condition at all points along hermal gradient.
-03078

F-ZONE WATER QUALITY IN LIVER- L BAY,
aster Univ., Bailrigg (England). Lancashire Western Sea Fisheries Joint Committee.
primary bibliographic entry see Field 5B.
-03092

STAL REGION RESIDENCE TIME ESTI- ES FROM CONCENTRATION DIENTS,
rio Ministry of the Environment, Toronto.
. Palmer.
nal of Great Lakes Research, Vol. 1, No. 1, p 41, October 1975. 8 fig, 3 tab, 11 ref.

riptors: *Great Lakes, *Water pollution ef- , *Coasts, *Trophic level, *Lakes, Water ty, Mass transfer, Boundary processes, ytical techniques, Surveys, Waste r(Pollution), Phosphorus, Chlorophyll, ada, *Path of pollutants, *Lake Superior. ifiers: *Residence time, *Concentration ents, *Thunder Bay(Ontario).

ethod for estimating the annual mean mass ange of dissolved solids (as measured by con- vity) and total phosphorus between coastal ffshore waters was discussed. This estimate evolved from concentration contours, water nes, and loadings using two assumptions: (1) ndwater exchange and atmospheric loadings egligible compared to other loadings, and (2) pration and precipitation are approximately . The annual mean mass exchange for the y conservative substance (dissolved solids) evaluated from the continuity equation using ng figures and the concentration contours for uctivity. A coastal residence time was esti- d for conductivity. The coastal residence time defined as the volume of the substance con- d in the coastal region divided by the mass nges for steady state. A similar technique sed for total phosphorus with the mass lost limentation determined by assuming that the coastal residence times for the dissolved solids and total phosphorus are similar. From the residence times, total phosphorus loadings, and details of the coastal region, it was possible to estimate the trophic state. The method was applied to surveys in the Thunder Bay region where the coastal region residence time was found to be 40 days and 40% of the discharged total phosphorus being lost to uptake sedimentation. The trophic state at the shallow nearshore region was found to be more eutrophic than the deeper, farther offshore regions. (Humphreys-ISWS)
W77-03093

IMPACTS OF THE DEPOSITION OF DREDGED SPOILS ON LAKE ERIE SEDIMENT QUALITY AND ASSOCIATED BIOTA,
State Univ. of New York Coll. at Buffalo. Great Lakes Lab.
R. Sweeney, R. Foley, C. Merckel, and R. Wyeth.
Journal of Great Lakes Research, Vol. 1, No. 1, p 162-170, October 1975. 1 fig, 3 tab, 28 ref.

Descriptors: *Lake Erie, *Spoil banks, *Dredging, *Water quality, Water pollution effects, On-site investigations, On-site data collections, Sediments, Water analysis, Biota, Benthic fauna, Oligochaetes, Nematodes, Heavy metals, Nitrogen, *Lake sediments, Nutrients, Water pollution sources.

Sediment samples were collected during June, August, and November, 1973 from 25 equally spaced stations over an area of nearly 64 sq km, the center of which was approximately 12 km north of Cleveland, Ohio. Within this zone was a United States Corps of Engineers 16.5 sq km dump site in which more than 18,960,000 cu m of dredgings from Cleveland Harbor and the Cuyahoga River had been deposited between approximately 1925 and 1968. Seven of the above stations were situated in this former dump site. Simultaneous collections were made at 25 equally spaced stations in a 64 sq km area situated southwest and adjacent to the region described above. The latter area had not been used as a dump site. Sediment gathered with Ponar dredges was analyzed for BOD, COD, phosphates (soluble and total), nitrogen (nitrates, ammonium, organic and total), oils and greases, chlorine demand, and heavy metals (mercury, iron, cadmium and chromium). In addition, quantitative and qualitative analyses for benthic macroinvertebrates were conducted. The concentrations of nutrients (phosphorus and nitrogen), toxicants (heavy metals), and pollutants (as indicated by chlorine demand, BOD, COD and oils and greases measurements) in the surface sediments generally were higher in the dump site than in the surrounding sediments. With regard to benthic macroinvertebrates, the lowest species diversity indexes and a highest oligochaete-to-total organism ratio generally were observed in the former spoils deposition region. It was concluded that the quality of the benthic environment was degraded by past dredging disposal practices. (Humphreys-ISWS)
W77-03094

PERMISSIBLE LEVEL OF BENZO(A)PLYRENE IN WATER BODIES, (IN RUSSIAN),
Institut Eksperimentalnoi i Klinicheskoi Onkologii, Moscow (USSR).
For primary bibliographic entry see Field 5B.
W77-03117

EFFECTS OF POTASSIUM ON ADULT ASIATIC CLAMS, CORBICULA MANILENSIS,
Illinois Natural History Survey, Urbana.
K. B. Anderson, C. M. Thompson, R. E. Sparks, and A. A. Paparo.
Biological Notes No. 98, Illinois Natural History Survey, Dept. of Reg. and Ed., Natural History Div., Urbana, July 1976, 7 p, 3 fig, 12 ref. OWRT B-097-ILL(1). 14-31-0001-6072.

Descriptors: *Clams, Aquatic environment, Mollusks, *Potassium, *Ions, Metals.
Identifiers: Mollusk control, *Metal ions, *Asiatic clams, Molluscacides.

Preliminary research results indicate that the use of metal ions, particularly potassium, alone or in conjunction with a molluscacide may possibly control the troublesome Asiatic clam population corbicula manilensis without damaging other organisms in the surrounding environment, if used cautiously and selectively. These conclusions were reached after testing the sublethal and lethal effects of potassium concentrations on the clam under laboratory conditions. The results indicated that potassium acts quickly to produce sublethal effects (foot immobilization and gaping); both effects were produced within 48 hours with the threshold concentration of potassium for foot immobilization being 120 mg per liter of water and for gaping 190 mg/liter. For a 96-hour period, a concentration of 225 mg/liter was lethal to 50% of all the test organisms. The investigators, in presenting their data and their discussion, recommend further research.
W77-03119

LITTER AND OIL ON THE SHORES OF UTSIRA, ROGALAND COUNTY, DURING AUTUMN 1974, (IN DANISH),
For primary bibliographic entry see Field 5B.
W77-03125

BIOGEOCHEMICAL DEVELOPMENT OF THE LAKE OF GENEVA (SWITZERLAND) FROM 1957 TO 1973: PART III, (IN FRENCH),
Paris Univ., Thonon-les-Bains (France). Center for Geodynamic Research.
B. Chassaing, P. Olive, J. P. Pelletier, and E. Siwertz.
Arch Sci (Geneva) 28(2), p 203-215, 1975.

Descriptors: *Bacteria, *Entrophication, *Geochemistry, Classification, Ecology, Zooplankton, Fungi, Phytoplankton, Lakes, Benthos, Fish, Cyanophyta.
Identifiers: Aphanizomenon-Flos-Aquae, Oscillatoria-Rubescens, Rhodomonas-Minuta, Stephanodiscus-Hantzschi, *Switzerland, *Lake of Geneva(Switz).

The living organisms in a lake are classified according to their ecologic role, as producers (chlorophyll bearing organisms), consumers (zooplankton, benthos and fishes) and decomposers (lower fungi, bacteria). The phytoplankton includes permanent species, such as Rhodomonas minuta and seasonal species like Stephanodiscus hantzschii, which develops explosively in spring. Occasional species include Oscillatoria rubescens and other Cyanophaceae (Aphanizomenon flos-aquae).--Copyright 1976, Biological Abstracts, Inc.
W77-03144

PLANKTON OF COASTAL LAGOONS: XI. TRANSPORT IN THREE ESTUARIES OF THE NORTHWEST OF MEXICO (NOVEMBER, 1973) (IN SPANISH),
Universidad Nacional Autonoma de Mexico, Mexico City. Instituto de Biologia.
For primary bibliographic entry see Field 2L.
W77-03145

EXPERIMENTAL STUDIES ON THE SECOND INTERMEDIATE HOSTS OF CLONORCHIS SINESIS: III. OBSERVATIONS ON THE RELATIONSHIP BETWEEN CLAVATE CELLS OF EPIDERMIS AND INFECTIVITY OF METACERACARIAE OF CLONORCHIS SINESIS IN FRESHWATER FISH, (IN KOREAN),
J. K. Rhee.
Korean J Parasitol 12(2); p 101-110, 1974.

Descriptors: *Fish, *Systematics, Asia, *Fish diseases, Freshwater fish, Rivers, Carp, Pollutant identification, Water pollution effects, *Fish parasites.
Identifiers: Acheilognathus-Spp, Anguilla-Japonica, Carassius-Carassius, *Clonorchis-Sinensis, Cobitis-Taenia, Coreoleuscus-Splendius, Coreoperca-Herzi, Cultriculus-Eigenmanni, Gnathopogon-Spp, Liobagrus-Mediadioosalis, *Metacercariae, Microphysogobio-Koreensis, Misgurnus-Anguillicaudatus, Parasilurus-Asotus, Pelteobagrus-Fuluidraco, Pseudogobio-Esocinus, Pseudoperilampus-Spp, Pseudorasbora-Parva, Pungtungia-Herzi, Relationship, Sarcocheilchthys-Czerskii, Zacco-Platypus, *Korea, *Clavate cells.

Epidermis samples from 26 spp. of fresh water fish from the main rivers of Korea were examined histologically. Generally the clavate cell had a simgle nucleus at its center. In Liobagrus mediadiposalis and Pelteobagrus fuluidraco the clavate cell had 2 nuclei with and independent so-called light halo of Oxner and sometimes had none of them. In Misgurnus anguillicaudatus, Cobitis taenia, L. mediadiposalis, P. fuluidraco, Parasilurus asotus and Anguilla iaponica, scales were not detected or were buried in the dermis layer, and the epidermis mostly consisted of clavate cells; no metacercariae were found. In Cyprinus carpio, Carassius carassius (crusian carp and golden crusian carp), Sarcocheilchthys czerskii, Pungtungia herzi and Coreoleuciscus spendius, scales were exposed over the epidermis, in which clavate cells were abundant; a few metacercariae were detected. No clavate cells were observed in Pseudorasbora parva, Zacco platypus, Microphysogobio koreensis, Gnathopogon majimae, G. Coreanus, Achelognathus signifer, A. vamatsutae, Cultriculus eigenmanni, Coreoperca herzi, Pseudoperilampus uvekii, P. notatus or Pseudogobio esocinus. These fishes with exposed scales on the epidermis serve as 2nd intermediate hosts of C. sinesis, Clavate cell presence in the epidermis of the fresh water fish seems correlated with the infectivity of the metacercariae of C. sinesis.--Copyright 1976, Biological Abstracts, Inc.
W77-03161

EFFECT OF ZINC-COATED CULVERTS ON VERTEBRATE AND INVERTEBRATE FAUNA IN SELECTED MAINE STREAMS,
Maine Univ., Orono. Dept. of Zoology.
R. W. Gregory, and J. Trial
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 344, Price codes: A02 in paper copy, A01 in microfiche Maine Land and Water Resources Institute, Orono, Completion Report, September 1975. 18 p, 9 tab, 39 ref. OWRT A-033-ME(1).

Descriptors: Zinc, *Culverts, Heavy metals, Benthic fauna, *Toxicity, Trout, *Maine, Streams, *Corrosion, Invertebrates, Atlantic salmon, Water pollution effects.
Identifiers: *Zinc toxicity, Vertebrate avoidance threshold, Galvanized culverts corrosion, Invertebrate diversity, Spongilla sp.

The effect of zinc loss from galvanized culverts on vertebrate and invertebrate fauna was investigated. Methods of analysis included the Mann-Whitney test for zinc analysis, electrofishing, invertebrate collection with a Hess sampler, and use of Simpson's diversity index. Results indicate that corrosion of galvanized culverts significantly increases zinc concentrations in stream water, particularly in newer culverts, although culverts five to six years old also demonstrate significant zinc losses. Highest zinc concentrations were found during conditions of highest temperature (20C) and low flow. No adverse effects of increased zinc concentrations were documented for either fish distribution or invertebrate diversity or abundance, with the possible exception of Spongilla. However, levels of zinc are at times, above the avoidance threshold (0.05 ppm) of Atlantic salmon, a particular concern in Maine. (Hutchins-Maine)
W77-03170

EFFECTS OF MERCURY AND COPPER ON THE OLFACTORY RESPONSE IN RAINBOW TROUT, SALMO GAIRDNERI,
Fisheries and Marine Service, Winnipeg (Manitoba). Freshwater Inst
T. J. Hara, Y. M. C. Law, and S. MacDonald
Journal of the Fisheries Research Board of Canada, Vol 33, No 7, p 1568-1573, July, 1976, 1 tab, 6 fig, 36 ref

Descriptors: *Rainbow trout, *Mercury, *Copper, *Analytical techniques, Environmental effects, *Bioassay, *Fish physiology, *Bioindicators, *Fish behavior, Methodology, Heavy metals, Biochemistry, Trout
Identifiers: *Olfactory response, *Olfactory sensitivity

The effects of mercury and copper on the olfactory response of rainbow trout (Salmo gairdneri) were studied by perfusing HgCl2 and CuSO4 solutions through the olfactory organs while recording the olfactory bulbar electrical responses to the standard stimulant, L-serine. The olfactory response was depressed during exposure to mercury and copper. The lowest concentrations of mercury and copper needed to cause appreciable effects within 2 h were estimated at 0.10 and 0.008 mg/liter, respectively. The depression increased with increase in the concentration and exposure time of the heavy metals. Recovery of the olfactory response was slower with higher concentrations and longer exposure. The method is rapid, accurate, and sensitive, and can be applied to other toxic chemicals and fish species. (Katz)
W77-03184

MACOMA BALTHICA: AN INDICATOR OF OIL POLLUTION,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 5A.
W77-03185

TOXICITY OF NO. 2 FUEL OIL TO COON STRIPE SHRIMP,
Battelle Pacific Northwest Labs., Sequim, Wash Marine Research Labs.
J. R. Vanderhorst, C. I. Gibson, and L. J. Moore
Marine Pollution Bulletin, Vol 7, No 6, June 1976, p. 106-108, 1 tab, 16 ref

Descriptors: *Oil, *Oil spills, *Water pollution effects, Crustaceans, *Shrimp, *Toxicity, *Bioassay, Laboratory tests, Laboratory animals, Fuel, Marine pollution, Marine animals, *Marine fisheries
Identifiers: No. 2 Fuel Oil, Coonstripe shrimp, Continuous flow bioassays, 96 hr L50, Pandalus danae.

Bioassay of a No. 2 fuel oil dispersion with shrimp in a continuous flow system using measured waterborne oil as the indicator of oil concentrations reveals a treatment more definable than those previously described in terms of volume ratios and produces lower lethal concentrations. Shrimp 96-h LC50 was 0.8 mg/l in this study as compared to values from 1.5 to 50 mg/l reported for other methods. Mean concentrations in tests do not give significant differences in concentration with respect to day of the test or spatial distribution in the exposure tanks. (Katz)
W77-03186

EFFECTS OF OIL POLLUTION ON BREEDING GREY SEALS,
West Wales Naturalist Trust, Haverfordwest (England).
J. E. Davis, and S. S. Anderson.
Marine Pollution Bulletin, Vol. 7 (6), June 1976, p 115-118, 5 tab, 1 fig, 10 ref.

Descriptors: *Oil, *Oil pollution, *Water pollution effects, Oil spills, Mammals, *Marine animals, Marine biology, Mortality, Growth rates, *Animal behavior, Environment, Social aspects, *Reproduction, Water pollution sources, Oil wastes
Identifiers: *Seals, *Grey seals, Wales, *Seal pups, Mothers, *Oiled seals, *Surival of seal pups

Marine mammals are probably frequently exposed to floating oil but little is known about the effects oil pollution has on them. Oil stranded on the shores in Pembrokeshire, West Wales in September 19 coincided with the start of the Grey Seal breeding season there. Observations have been made on the effect the oil had on the new born pups and their mothers. Behavior of oiled seals did not appear to differ from that of normal seals. Peak weights of oiled pups were significantly lower than those of unoiled pups but there is little point of cleaning individual animals. (Katz)
W77-03187

IMMEDIATE INDUSTRIAL EFFECTS ON SEDIMENT MERCURY CONCENTRATIONS IN A CLEAN COASTAL ENVIRONMENT,
Florida State Univ., Tallhassee Dept. of Oceanography
For primary bibliographic entry see Field 5B.
W77-03188

THE EFFECT OF DETERGENTS ON LARVAL DEVELOPMENT OF A CRAB,
K. Czyzewska
Marine Pollution Bulletin, Vol. 7, No. 6, June 1976, p. 108-112, 7 tab, 1 fig, 20 ref

Descriptors: **Crustaceans, Aquatic animals, *Crabs, *Commercial shellfish, *Toxicity, *Bioasssay, Laboratory animals, Larvae, Reproduction, *Synthetic detergents, Water pollution, Water pollution sources, Marine fish
Identifiers: Larval development, Anionic detergents, Non-ionic detrgents, Ethoxylate detergents, *Alkylate detergents, Crab larvae, Rhithropanopeus, Larval mortality, Detergent mixtures

The effect of a mixture of anionic (ethoxylate) and non-ionic (alkylate) detergents on development stages of the crab Rhithropanopeus from fresh embryogenesis to the Megalopa larval stage has been studied. Larval resistance increases with age. Larvae still in the eggshells are only slightly sensitive because of the thick and impermeable chorion. Low concentrations of detergents exert favourable effect, causing a decrease in larval mortality, but during moults there is an increase in mortality and a lengthening of the development period of the larvae. The mixture of detergents is more toxic than single detergents. (Katz)
W77-03189

EFFECTS OF OIL ON BEACHES IN WEST CORK, IRELAND,
University Coll., Cork (Ireland). Dept. of Botany
J. P. Cullinane, and P. M. Whelan
Marine Pollution Bulletin, Vol. 7, No. 4, April 1976, p. 72-73, 1 ref.

Descriptors: *Oil, *Oil spills, Water pollution effects, Water pollution sources, Alae, *Marine algae, *Mortality, Mode of action, Benthic animals, *Barnacles, *Seaweeds, Beaches, Recreation facilities
Identifiers: *Ireland, *Oil lumps, *Lichens, *Goose barnacles, Congealed oil, West Cork(Ireland)

Large lumps of congealed oil, probably tanker last, were washed ashore on beaches of the South Coast of Ireland. Effects of the oil on seaweed and barnacles are described. (Katz)
W77-03192

U. of I. URBANA-CHAMPAIGN

LUENCE OF ILLUMINATION ON TOTOXICITY OF CRUDE OIL,
eum National d' Histoire Naturelle, Paris nce). Laboratoire de Physiologie Generale et paree.
LaCaze, and O. Villedon de Naide.
ine Pollution Bulletin Vol. 7 (4), April 1976, p. 6.

criptors: *Oil, *Oil spills, Water pollution ef-, Oil wastes, Water pollution sources, Dis-rs, Oil waters, Algae, *Marine algae, *Marine kton, *Toxicity, Mortality, Biodegradation, t physiology, Mode of action, *Phytotoxicity, oplankton, *Detergent.
tifiers: Kuwait crude oil, Microalgae, odactylum tricornutum, Marine phytoplank-*Chemical dispersant, Corexit 8666.

oleum products discharged at the water sur- are rapidly modified under the effect of ico-chemical and biological transformations, nselves closely dependent on ecological fac- The role of some of these, such as illumina- may be particularly significant. This report s with the effect of this parameter on the otoxicity of Kuwait crude oil on the primary uction of a microalga (Phaedodactylum tricor-m) and marine plankton communities. The lt of these investigations indicates that the tox- of extracts made from a crude oil is about two ree times greater when the latter is previously ected to illumination of sufficient intensity duration. The incorporation of a chemical ersant (Corexit 8666) magnifies this nomenon. In the case of a weathered crude oil d in equal parts with the dispersant, illumina-raises the toxicity of the extracts by a factor out 30. (Katz)
-03193

EFFECT OF OIL POLLUTION IN BANTRY
versity Coll., Cork (Ireland). Dept. of Botany.
Cullinane, P. McCarthy, and A. Fletcher.
ne Pollution Bulletin, Vol. 6, No. 11, ember 1975, p. 173-176, 2 tab, 1 fig, 5 ref.

criptors: Oil, *Oil spills, Water pollution ef-, *Oil wastes, Water pollution sources, Dis-rs, Oily waters, Atlantic Ocean, Algae, rine algae, *Kelps, Periphyton, *Lichens, ology, *Detergents.
tifiers: *Biological damage, Bantry Ireland), Seaweeds, *Crude oil spill, Damage egetation, *Damage to lichens, Clean-up ef-, Detergent effects, BP 1100X, Alkaline rinated detergent, *Ireland.

biological damage caused by the large oil spill antry Bay and the clean-up measures adopted al with it has been followed up in the months wing the oil spill. This report refers to damage gae and lichens. (Katz)
-03194

MPIC ALLIANCE OIL SPILLAGE,
ollution South East Kent, Dover (England).
Dixon, and T. R. Dixon.
ne Pollution Bulletin, Vol. 7 (5), May 1976, p. , 3 tab, 4 fig, 12 ref.

riptors: *Oil, *Oil spills, Water pollution ef-, *Oil wastes, *Water pollution sources, Dis-s, *Oil waters, Altantic Ocean, Birds, Water , Gulls, Mortalities, Gulls.
tifiers: Olympic Alliance Oil Splill, Strait of r, Ship collision, English coastline, rance organization, Oil clearance methods, norants, Eider, Coot, Kittiwake, Razorbill, emot, Oiled birds.

ite the 1967 traffic separation scheme for the ts of Dover another loaded tanker was ged in a Channel collision. On this occasion oximately 2000-3000 tons of oil were spilt and despite extensive and rapid measures to disperse it at sea, the English coastline was again affected. Oil clearance organization and methods were described, the estimates of the numbers and species of oiled sea birds are given. (Katz)
W77-03195

TOXICITY OF CRUDE OILS AND A DISPERSANT TO THE STONY CORAL MADRACIS MIRABILIS,
Caraibisch Marien-Biologisch Instituut, Curacao (Netherlands, Antilles).
J. H. B. W. Elgershuizen, and H. A. M. deKruijf.
Marine Pollution Bulletin, Vol. 7(2), February 1976, p. 22-23.

Descriptors: *Oil wastes, *Oil pollution, Water pollution, *Benthic fauna, Coral, Invertebrates, *Marine animals, Atolls, Reefs, Detergents, Tropical regions, *Toxicity, Mortality, Bioassay.
Identifiers: Stony coral, Madracis mirabilis, Coral reefs, Dispersant, Leeward Islands, Chemical oil spill removers, Shell-dispersant LTX, Crude oil, Nigerian crude oil, Forcados crude oil, Tia Juana Pesada crude oil.

Coral reefs play a crucial role in the ecology of coastal tropical waters. In many areas they are now exposed to pollution hazards which have sometimes caused severe damage. Increasingly they are exposed to oil and, where clean-up methods are used, to dispersants. This report shows that the clean-up may be more damaging than the oil. (Katz)
W77-03196

EFFECTS OF CRUDE OIL ON AMERICAN LOBSTER (HOMARUS AMERICANUS) LARVAE IN THE LABORATORY,
Guelph Univ. (Ontario). Dept. of Zoology.
P. G. Wells, and J. B. Sprague.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 6, p. 1604-1614, 1976. 1 tab., 5 fig., 57 ref.

Descriptors: *Oil wastes, *Water pollution effects, *Lobster, *Larval growth stage, *Shellfish, *Lethal limit, *Toxicity, *Bioassay, *Larval, *Oily water, *Oil pollution, Animal behavior, Growth rates, Growth stages, Laboratory tests, Mortality, Commercial shellfish, Invertebrates, Methodology.
Identifiers: *Sublethal effects.

Four day LC50's for Venezuelan Tia Juana crude oil were 0.86 mg/liter for first-stage larvae of the American Lobster (Homarus americanus) and 4.9 mg/liter for third- and fourth-stage larvae. The 30-day LC50 was 0.14 mg/liter for larvae starting the test in their first stage. The threshold for retardation of larval development was about the same as the 30-day LC50. Decreased food consumption was demonstrated at 0.19 mg/liter. More 'intermediate' larvae developed in oil exposures but no threshold was estimated. The ratio of 'safe' to acutely lethal concentrations was about 0.03. Oil concentrations decreased during exposures; stated values could be multiplied by 0.59 to arrive at conventional average exposures. Aged dispersions were equally toxic. Post-larval lobsters dug significantly more burrows when the substrate contained oil but did not avoid oiled substrate, nor was growth or survival affected for substrates containing up to 1740 mg/liter of oil. (Katz)
W77-03197

EFFECTS ON FERTILIZATION AND DEVELOPMENT OF THE COMMON MUSSEL, MYTILUS EDULIS AFTER LONG-TERM EXPOSURE TO A NONIONIC SURFACTANT,
Kristinebergs Zoologiska Station (Sweden).
A. Granmo, and G. Jorgensen.
Marine Biology, Vol. 33, No. 1, p. 17-20, 1975. 2 fig., 8 ref.

Descriptors: *Mussels, *Surfactants, *Reproductions, *Water pollution effects, *Spawning, *Larval growth stage, *Larvae, Detergents, Environmental effects, Animal physiology, Invertebrates, Shellfish, Laboratory tests, Lethal limit.
Identifiers: *Sublethal effects.

Common mussels (Mytilus edulis L.) were exposed over a 5-month period to low-level concentrations (0.5 to 1.5 ppm) of a nonionic surfactant. Upon maturation at the end of this period, spawning ability was examined. Fertilization occurred at low-level concentrations (0.1 to 2.0 ppm) of the surfactant, and was most successful for gametes from the long-term controls and the highest long-term concentration (1.5 ppm). Inhibited or delayed larval development was observed, related to the concentration gradient of the short-term exposures. Gametes from mussels long-term exposed to the surfactant were more sensitive than those from the longterm control. (Katz)
W77-03198

DESTRUCTIVE GRAZING OF KELP BY SEA URCHINS IN EASTERN CANADA,
Dalhousie Univ., Halifax (Nova Scotia). Dept. of Biology.
P. A. Breen, and K. H. Mann.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 6, p. 1278-1283, June, 1976. 4 fig., 28 ref.

Descriptors: *Biological communities, *Food chains, *Kelps, *Primary productivity, *Algae, *Habitats, *Aquatic populations, *Plant populations, Aquatic plants, Crustaceans, Aquatic populations, On-site data collection, *Canada, Bays.
Identifiers: *Sea urchins, Laminaria, *St. Margaret's Bay(Nova Scotia).

Destruction of kelp beds by sea urchins has been documented in St. Margaret's Bay, Nova Scotia, and also appears to be taking place in other parts of eastern Canada. Continued sea urchin settlement onto grazed areas prevents the return of kelp and other algae for long periods. Because of the large contribution of kelp beds to coastal productivity, the disappearance of kelp from large areas is alarming. Dynamics of sea urchin grazing are discussed. (Katz)
W77-03199

PHYTOPLANKTON ECOLOGY IN VALPARAISO BAY: III. PHYTOPLANKTON FROM 1972-73, (IN SPANISH),
Chile Univ., Valparaiso. Departamento de Oceanologia.
S. Avaria, and E. Orellana.
Rev Biol Mar 15(3), p 207-226, 1975.

Descriptors: Biomass, South America, Bays, *Phytoplankton, Ecology, Distribution.
Identifiers: *Chile, *Valparaiso Bay(Chile), Vertical distribution.

An analysis of the phytoplankton from the surface to 30 m depth was made between April 1972 and April 1973. Approximately (Chile), weekly samples were taken in the same station, 2 miles from the shore off Renaca beach, in Valparaiso Bay for a total of 252 samples. General aspects of annual cycle, biomass evaluation, specific composition, population structure and vertical distribution are discussed.--Copyright 1976, Biological Abstracts, Inc.
W77-03200

ECOLOGY OF AQUATIC SAPROPHYTIC PHYCOMYCETES. II, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
N. Ya. Artemchuk.
Mikol Fitopatol 9(2), p 89-91, 1975.

Descriptors: *Ecology, *Salinity, *Temperature, *Carbon, Water pollution effects.
Identifiers: Saprophytic phycomycetes, *Organic carbon.

Data are presented on the distribution of aquatic saprophytic phycomycetes in relation to the ecological factors affecting their settlement: salinity, temperature and content of organic C in water.--Copyright 1976, Biological Abstracts, Inc.
W77-03201

EFFECT OF COPPER ON SOME ASPECTS OF THE BIOENERGETICS OF RAINBOW TROUT (SALMO GAIRDNERI),
Guelph Univ. (Ontario). Dept. of Zoology.
P. F. Lett, G. J. Farmer, and F. W. H. Beamish.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 6, p. 1335-1342, June, 1976. 4 fig, 2 tab., 22 ref.

Descriptors: *Copper, *Water pollution effects, *Growth rates, *Stress, *Rainbow trout, *Feeding rates, *Adaptation, *Heavy metals, *Digestion, Laboratory tests, Bioassay, Environmental effects, Trout, Diets, Fish physiology, Metabolism, Lethal limit.
Identifiers: *Sublethal effects.

The influence of sublethal concentrations of total copper on the appetite, growth, and proximate body composition of rainbow trout (Salmo gairdneri) held in hard water (365 mg/liter) was measured over a 40-day interval. The initial response of trout exposed to concentrations of copper ranging from 0.0 to 0.3 mg/liter (the 96-h LC50 was 0.25-0.68) was the cessation of feeding. Thereafter, food intake gradually returned to amounts observed for control fish, the rate of return of appetite being dependent on copper concentration and ration level. Growth rate of trout exposed to copper (0.075-0.225 mg/liter) and fed rations of either 0.25 or 1.5% dry food wt/wet fish wt per day was initially depressed but approached values observed for control fish near the end of the 40-day interval. During this period, lipid, protein, and moisture of fish exposed to copper did not change significantly. Initial growth retardation was not attributable to the inability of copper-exposed fish to digest their daily rations. Results are discussed in terms of the ability of fish to adapt to stress imposed by sublethal concentrations of heavy metals. (Katz)
W77-03203

EFFECTS OF CHRONIC DDT/DDE EXPOSURE ON ANESTHETIC INDUCTION AND RECOVERY TIMES IN RAINBOW TROUT (SALMO GAIRDNERI),
Fisheries and Marine Service, Winnipeg (Manitoba). Freshwater Inst.
J. F. Klaverkamp, W. L. Lockhar, D. Metner, and N. Grift.
Journal of the Fisheries Research Board of Canada, Vol 33, No 6, p. 1331-1334, June, 1976. 2 fig., 30 ref.

Descriptors: *Water pollution effects, *DDT, *DDE, *Bioassay, *Rainbow trout, *Mode of action, Animal physiology, Trout, Metabolism, Laboratory tests, Chlorinated hydrocarbon pesticides, *Lethal limit.
Identifiers: *Sublethal effects, *Phenoxyethanol, *M.S.222, *Anesthetics, *Chemical interactions.

In rainbow trout (Salmo gairdneri) fed pellets containing 4.55 microgram/gr of DDT and 6.81 microgram/gr DDE every other day, anesthetic induction and recovery times of phenoxyethanol (PE) were less than those in control fish. No interactions were observed in fish fed DDT/DDE and anesthetized with ethyl m-aminobenzoate methanesulphonate (M.S.222). Differences observed between fish fed DDT/DDE and anesthetized with PE as compared to M.S.222 could be due either to enhanced metabolism of PE or to the fact that PE and M.S.222 have different modes or sites of action. (Katz)
W77-03204

EFFECT OF TEMPERATURE AND SALINITY ON EXTENSION OF SIPHONS BY MERCENARIA MERCENARIA,
Oak Ridge National Lab., Tenn. Environmental Sciences Div.
W. VanWinkle, S. Y. Feng, and H. H. Haskin.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 7, p. 1540-1546, July, 1976. 3 tab., 4 fig., 9 ref.

Descriptors: Environmental effects, *Temperature, *Salinity, *Clams, *Commercial shellfish, *Water temperature, *Animal behavior, *Animal physiology, Analytical techniques, *Respiration, Invertebrates, Molluscs, Laboratory tests, Seasonal, Bioassay, Crustaceans, *Siphons.
Identifiers: Quahog clams.

Extension of siphons was used as a criterion of activity to examine the response of the quahog clam, Mercenaria mercenaria, to various combinations of test and acclimation temperatures and salinities. A quadratic regression model for the percentage of clams active as a function of the test temperature and salinity was assumed, and response surface contours for various percentages of activity were calculated and plotted. The regression model accounted for 72-88% of the observed variability in the 13 experiments considered. The contours are hyperbolic instead of elliptical for five of the experiments; no biologically meaningful estimates of the lower and upper temperature and salinity limits can be obtained in such cases. Low levels of activity, even at optimal T-S combinations, occurred during the summer. Some of the observed shifts in the position and shape of the temperature-salinity response surfaces were expected in light shifts in acclimation temperature or salinity. Other shifts in response surface could not be accounted for. The implications of these results for the purification of quahog clams harvested from polluted waters are discussed. (Katz)
W77-03205

HEAVY METALS IN LAKES OF THE COEUR D'ALENE RIVER VALLEY, IDAHO,
Idaho Univ., Moscow. Dept. of Zoology.
For primary bibliographic entry see Field 5B.
W77-03207

BIOLOGICAL AND CHEMICAL EVALUATION OF THE AQUATIC ENVIRONMENT OF SELECTED UNDEVELOPED KENTUCKY LAKE EMBAYMENTS,
Kentucky Water Resources Research Inst., Lexington.
M. Gordon, and M. E. Sisk.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 367, Price codes: A06 in paper copy, A01 in microfiche. Research Report No. 99, December 1976. 117 p, 39 fig, 14 tab, 51 ref. OWRT A-057-KY(1). 14-31-0001-4017. 14-31-0001-5017. 14-31-0001-6018.

Descriptors: Plankton, Benthos, Fish, Pollutants, *Kentucky, Productivity, Limnology, Lakes, Organic wastes, Phosphates, Nitrates, Dissolved oxygen, Hydrogen ion concentration, Phytoplankton, Standing crops.

This report describes research involving biological and chemical analysis of two undeveloped embayments on Kentucky Lake, namely Anderson and Vickers Bays. Field and laboratory studies were made to assess current biotic standing crops, limnological conditions and levels of inorganic and organic pollutants in the embayments. Levels of phosphates, nitrates, and organics are in low to moderate concentrations. The concentration of dissolved oxygen is not a limiting factor, since stress and/or death does not occur in aquatic life until the dissolved oxygen is below 4 ppm. T hydrogen ion concentration is between 5.0 and that has been established as not lethal to m freshwater fishes. Alkalinity is within the nor range for surface waters. Specific conductanc less than 100 micromhos, the maximum value most waters in Eastern United States. The t dissolved solid concentration derived fr specific conductance (100 to 200 ppm) is within range for most open basin lakes. Average mont total phytoplankton counts in the embayment dicate low to moderate levels of enrichment. B embayments are relatively free of gross orga and industrial pollutants. This survey provi established physical, chemical, and biological d which may be useful in detecting future change the environment before deleterious effects produced.
W77-03209

ORGANIC PHOSPHORUS IN LAKES,
Wisconsin Univ., Madison. Water Chemistry L
S. J. Eisenreich.
Available from the National Technical Infor tion Service, Springfield, VA 22161 as PB-262 4 Price codes: A11 in paper copy, A01 in microfic Ph.D. Thesis, 1976. 191 p, 31 fig, 18 tab, 82 OWRT B-088-WIS(1). 14-31-0001-4140.

Descriptors: *Phosphorus, *Lak *Eutrophication, *Algae, Chemicals, *Metals, ganic wastes, *Wisconsin, Phosphates, Analyt techniques.
Identifiers: *Organic phosphorus, Chemical tr ment, Alum, *Aluminum hydroxide, Inorga phosphorus.

The chemical factors controlling the removal particulate phosphorus (PP), organic phospho (Po) and inorganic phosphorus (Pi) from l waters by aluminum hydroxide have been vestigated. Aluminum hydroxide has large adso tion capacity for Pi in distilled and lake water vironments (250-280 micro-g P/mg Al). Optimu removals occurred at low (<4) and high pH (10), and were minimum in the pH range norm encountered in natural waters. The adsorption Pi and model Po species by amorphous Al-hyd ide was studied over the equilibrium concentra range of 8 x 10-7 to 1 x 10-4 M under normal l pH conditions using the Langmuir adsorp isotherm. The interactions of natural and mode compounds with aluminum hydroxide lead to belief that the fraction of native Po which is responsive to alum treatment consists o heterogeneous component formed by the asso tion of biologically-produced Po and native Pi v inorganic and organic matter in the lake water not identical to Po compounds normally isol from aquatic organisms. Solution composi cannot alone account for the lack of Po remo with alum. The non-responsive nature of the component is most likely a result of steric, st tural or localized ionic aberrations. The ultim success of lake rehabilitation by alum treatm depends primarily on three factors: (1) the ef tive immobilization of Pi and Po in the w column; (2) the inhibition of P regeneration f the sediments by covering with a layer of Al- and (3) the limitation of P inputs from exte sources. The lake should be treated at spring or overturn when Pi is the predominant P form achieve maximum P removals. A simpli method for the analysis of total P (TP), total solved P (TDP) and dissolved reactive P (DRP multiple water samples has been developed
W77-03210

ASSESSMENT OF POTENTIAL INTER TIONS OF MICROORGANISMS AND POL TANTS RESULTING FROM PETROLE DEVELOPMENT ON THE OUTER CONTIN TAL SHELF IN THE BEAUFORT SEA,
Louisville Univ., Ky. Dept. of Biology.
R. M. Atlas.

Environmental Assessment of the Alaskan
inental Shelf. Principal Investigators' Reports
e Year Ending March 1976, Vol 9. Chemistry
Microbiology, p 1-286, April 1976. 2 fig, 44
5 ref.

riptors: *Alaska, *Microorganisms,
utants, Ecosystems, *Oil pollution, *Oil
, *Baseline studies, *Resources develop-
, *Environmental effects, *Water pollution
ts, Ecology, Data collections, Bacteria,
, Enteric bacteria.
ifiers: *Outer Continental Shelf, *Petroleum
rces, Oil exploration, Oil development,
fort Sea, Salmonella-Shigella, Vibrio, Pseu-
nas.

potential interactions of microorganisms and
ants that may result from development of
leum resources in the outer continental shelf
e Beaufort Sea were investigated. Studies
begun on establishing a baseline description
icrobial communities in the Beaufort Sea.
baseline description includes quantitative in-
ation on the occurrence of different
ological groups of microorganisms and on the
ative taxonomic characteristics of dominant
es of microorganisms. It includes information
e ability of the indigenous microorganisms to
form petroleum hydrocarbons that might
the ecosystem from outer continental shelf
leum development. A review of existing
ure on microorganisms in the Beaufort Sea
ling microorganisms related to petroleum
ants was conducted using the computer
n facilities OASIS and of the Lockheed data
(Sinha-OEIS)
03217

SSMENT OF POTENTIAL INTERAC-
S OF MICROORGANISMS AND POLLU-
'S RESULTING FROM PETROLEUM
ELOPMENT ON THE OUTER CONTINEN-
SHELF IN THE GULF OF ALASKA,
ville Univ., Ky. Dept. of Biology.
Atlas.
nvironmental Assessment of the Alaskan
nental Shelf. Principal Investigators' Reports
e Year Ending March 1976, Vol 9. Chemistry
licrobiology, p 287-345, April 1976. 2 fig, 25
0 ref.

iptors: *Alaska, *Microorganisms, Pollu-
Water pollution effects, *Environmental ef-
*Baseline studies, *Oil pollution, *Oil spills,
urces development, Shellfish, Enteric bac-
Data collections.
fiers: *Outer Continental Shelf, *Petroleum
rces, Oil exploration, *Oil development,
of Alaska, Human pathogens, Salmonella-
la, Vibrio.

otential interactions of microorganisms and
ants that may result from development of
eum resources in the outer continental shelf
Gulf of Alaska were investigated. Studies
begun on establishing a baseline description
crobial communities in the Gulf of Alaska.
aseline description includes quantitative in-
tion on the occurrence of different
logical groups of microorganisms and on the
ative taxonomic characteristics of dominant
s of microorganisms. It includes information
ability of the indigenous microorganisms to
orm petroleum hydrocarbons that might
the ecosystem from out continental shelf
eum development. Also, information is in-
on the natural incidence of potential human
gens in shellfish in the Gulf of Alaska. A
of existing literature on microorganisms in
lf of Alaska including microorganisms re-
to petroleum pollutants and pathogenic
rganisms was conducted using the com-
search facilities OASIS and of the Lockheed
ase. (Sinha-OEIS)
3218

TRACE HYDROCARBON ANALYSIS IN PREVIOUSLY STUDIED MATRICES AND METHODS DEVELOPMENT FOR: (A) TRACE HYDROCARBON ANALYSIS IN SEA ICE AND AT THE SEA ICE-WATER INTERFACE, (B) ANALYSIS OF INDIVIDUAL HIGH MOLECULAR WEIGHT AROMATIC HYDROCARBONS,
National Bureau of Standards, Washington, D. C. Trace Organic Analysis Group.
For primary bibliographic entry see Field 5A.
W77-03219

ENVIRONMENTAL ASSESSMENT OF ALASKAN WATERS - TRACE ELEMENT METHODOLOGY - INORGANIC ELEMENTS,
National Bureau of Standards, Washington, D. C.
For primary bibliographic entry see Field 5A.
W77-03220

DISTRIBUTION OF LIGHT HYDROCARBONS, C1-C14, IN THE NORTHEAST GULF OF ALASKA AND THE SOUTHEASTERN BERING SHELF,
National Oceanic and Atmospheric Administration, Seattle, Wash. Pacific Marine Environmental Lab.
For primary bibliographic entry see Field 5B.
W77-03221

BASELINE STUDY OF MICROBIAL ACTIVITY IN THE BEAUFORT SEA AND GULF OF ALASKA AND ANALYSIS OF CRUDE OIL DEGRADATION BY PSYCHROPHILIC BACTERIA,
Oregon State Univ., Corvallis. Dept. of Microbiology.
R. Y. Morita, and R. P. Griffiths.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Report for the Year Ending March 1976, Vol 10. Chemistry and Microbiology, p 147-191, April 1976. 12 fig, 9 tab. 03-5-022-68.

Descriptors: *Alaska, *Microbial degradation, *Oil spills, *Oil pollution, *Microorganisms, *Resources development, *Water pollution, *Baseline studies, *Environmental effects, Bacteria, Sediments, Biodegradation, Pollutant identification.
Identifiers: *Outer Continental Shelf, *Crude oils, Oil exploration, Oil development, Microbial activity, *Gulf of Alaska, *Beaufort Sea, *Psychrophilic bacteria, Desulfovibrio.

The levels of potential glutamic acid uptake observed in water samples taken from the Beaufort Sea were as high as those observed in other relatively productive marine waters. In both Barrow and Prudhoe Bay there were locations which consistantly showed higher levels of potential microbial activity. When the effects of incubation temperature on the maximum potential velocity of glutamic acid uptake was studied, it was found that there was a marked increase with increasing incubation temperature. Studies on the effects of melted ice water on heterotrophic potential data suggest that when melting ice water is released into the surrounding seawater, there is little effect on the observed microbial activity or the percent respiration. The acute effects of crude oil on the uptake and respiration of glutamic acid was studied by adding an aqueous crude oil extract to the reaction bottles used to determine heterotrophic potential. No consistant alteration in function was observed when the extract was added. Changes in the heterotrophic potential with time were studied in a natural microbial population exposed to crude oil using both labeled glutamic acid and acetate. In the initial stages of incubation, the levels of activity were lower in the crude oil enrichment but as incubation progressed, the levels of activity increased. Sulfate reducing bacteria appear to be very common in the inshore sediments of the Beaufort Sea. Psychrophilic crude oil degrading bacteria are probably quite rate in the waters of the Beaufort Sea. Of the 150 crude oil degrading bacterial strains isolated from this region, only three strains have a maximum growth temperature below 20C. Hence most of the bacteria degrading crude oil are probably psychrotrophic. (Sinha-OEIS)
W77-03223

HYDROCARBONS: NATURAL DISTRIBUTION AND DYNAMICS ON THE ALASKAN OUTER CONTINENTAL SHELF,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 5B.
W77-03224

MICROBIAL RELEASE OF SOLUBLE TRACE METALS FROM OIL IMPACTED SEDIMENTS,
Alaska Univ., College. Inst. of Marine Science.
R. Barsdate.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 10. Chemistry and Microbiology, p 367-380, April 1976. 1 tab. 03-5-022-56.

Descriptors: *Alaska, *Oil pollution, *Copper, *Water pollution, *Oil spills, *Baseline studies, *Resources development, *Environmental effects, Sediments, Benthos.
Identifiers: *Outer Continental Shelf, Bering Sea, Trace metals.

This project is an investigation of the possible remobilization of trace metals from crude oil impacted sediments. The initial results of laboratory experiments suggest that the copper concentration of sediment pore water may increase following the addition of oil, and tentatively the effect is ascribed to the occlusion of trace metal binding or exchange sites by components of the oil. The primary activity of the study has been to follow the distribution and/or abundance of metals with time in small experimental containers to which oil has been added. Two principal analytical methodologies have been employed -- a radioisotope tracer technique and anodic stripping voltammetry. The initial results indicate a distinct but small increase in total dissolved copper following the addition of oil to water-sediment systems. Since the increase appears within twenty-four hours, the most likely but highly tentative conclusions is that the oil has occluded trace metal sorption/ion exchange sites on the sediment particles. (Sinha-OEIS)
W77-03225

INCIDENCE OF PATHOLOGY OF MARINE FISH DISEASES IN THE GULF OF ALASKA, BERING SEA, AND BEAUFORT SEA,
California Univ., Davis.
For primary bibliographic entry see Field 5B.
W77-03226

EFFECTS OF SEASONABILITY AND VARIABILITY OF STREAMFLOW ON NEARSHORE COASTAL AREAS,
Alaska Univ., College. Inst. of Water Resources.
R. F. Carlson.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 11. Physical Oceanography and Meteorology, p 23-73, April 1976. 10 fig, 4 tab, 15 ref. 03-5-022-56.

Descriptors: *Alaska, *Streamflow, *Oil spills, *Oil pollution, *Water pollution, *Baseline studies, *Resources development, *Environmental effects, Seasonal, Sediments, Leases.
Identifiers: *Outer Continental Shelf, Oil exploration, Oil development, *Petroleum resources, Near-shore processes.

An understanding of the seasonability and variability of streamflow is of considerable engineering importance to the imminent oil and gas develop-

ment. Streamflow variability, the effects of seasonal ice, as well as sediment characteristics and ice jam flooding have considerable impact on nearshore and estuarine areas. This is especially so in areas where sea ice remains intact after the initiation of river break-up. This occurs in nearly all rivers and streams in the North Bering, Chukchi, and Beaufort Seas, because the extensive areas of shorefast ice formed annually in these areas. The estuarine and shorefast areas are presently being developed and leased and this development is likely to continue throughout the O.C.S. program. In addition to the statistical characterization using standard hydrological methods, the following parameters are described for the 41 streams which have been gaged for varying periods of time: average period of break-up initiation (10 day period); average period of freeze-up (10 day period); miscellaneous break-up and freeze-up data; relative hypsometric curve for each basin; observations on past ice jam flooding; verbal description of annual flow variation; and use of original indices developed in this study to relate streamflow variability to basin characteristics and regional climate. (Sinha-OEIS)
W77-03229

GULF OF ALASKA STUDY OF MESOSCALE OCEANOGRAPHIC PROCESSES (GAS-MOP),
National Oceanic and Atmospheric Administration, Seattle, Wash. Pacific Marine Environmental Lab.
For primary bibliographic entry see Field 6G.
W77-03230

BRISTOL BAY OCEANOGRAPHIC PROCESSES (B-BOP),
National Oceanic and Atmospheric Administration, Seattle, Wash. Pacific Marine Environmental Lab.
For primary bibliographic entry see Field 5B.
W77-03232

STD MAPPINGS OF THE BEAUFORT SEA SHELF,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 2L.
W77-03233

OUTER CONTINENTAL SHELF ENERGY PROGRAM,
National Oceanic and Atmospheric Administration, Miami, Fla. Atlantic Oceanographic and Meteorological Labs.
For primary bibliographic entry see Field 5B.
W77-03234

MESOSCALE CURRENTS AND WATER MASSES IN THE GULF OF ALASKA,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 5B.
W77-03236

HISTORICAL AND STATISTICAL OCEANOGRAPHIC DATA ANALYSIS AND SHIP OF OPPORTUNITY PROGRAM,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 5A.
W77-03237

TRANSPORT OF POLLUTANTS IN THE VICINITY OF PRUDHOE BAY, ALASKA,
National Environmental Research Center, Corvallis, Oreg.
For primary bibliographic entry see Field 5B.
W77-03238

BENTHOS-SEDIMENTARY SUBSTRATE INTERACTIONS,
Alaska Univ., College. Inst. of Marine Science.
C. M. Hoskin.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 13. Geology, p 25-305, April 1976. 1 fig, 2 tab, 18 ref. 03-5-022-56.

Descriptors: *Alaska, *Benthos, *Oil pollution, *Water pollution effects, *Resources development, *Baseline studies, *Environmental effects, *Bottom sediments, Sediments.
Identifiers: *Outer Continental Shelf, *Petroleum resources, Oil exploration, Oil development, Substrates, *Bering Sea.

The overall goal of the work was to relate grainsize characteristics of bottom sediment to the distribution and abundance of benthos living in and on the sedimentary substrate. Because there are interactions between living benthos and their sedimentary substrate, perturbations in the physical or chemical nature of the substrate may cause perturbation in the distribution, species composition, and/or abundance of the benthos. Because the benthos, and man, are important parts of the food web in the Bering Sea, baseline data are needed to evaluate changes in the sedimentary substrate that could occur through exploitation of oil and gas resources. (Sinha-OEIS)
W77-03263

THE INTERACTION OF OIL WITH SEA ICE IN THE ARCTIC OCEAN,
Washington Univ., Seattle. Dept. of Oceanography.
S. Martin.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 14. Ice, p 1-7, April 1976. 2 fig. 03-5-022-67.

Descriptors: *Arctic Ocean, *Sea ice, *Oil spills, *Oil pollution, *Water pollution, *Baseline studies, *Resources development, *Environmental effects, Cold regions.
Identifiers: *Outer Continental Shelf, *Oil exploration, *Oil development, *Petroleum resources, Oil-ice interaction, Bering Sea, Beaufort Sea.

The purpose of the present study was to outline the various ways in which the sea ice of the Alaskan coast will entrain and interact with an oil spill or blow-out under the ice. The study concentrates on the small-scale properties of sea ice; namely, its salinity, temperature, and crystal structure, and is only indirectly concerned with the large scale transport and deformation of sea ice. The study divides into two parts: a laboratory experiment on ice growth in a wave field, which stimulates parts of the Bering Sea, and a field survey which consists of taking ice cores from the Beaufort Sea at different times of the year. In the laboratory experiment oil was injected under the growing ice to study the entrainment; in the field survey, cores were analyzed to see how oil might be entrained within them. (Sinha-OEIS)
W77-03267

ENVIRONMENTAL INVENTORY AND ASSESSMENT OF NAVIGATION POOLS 24, 25, AND 26, UPPER MISSISSIPPI AND LOWER ILLINOIS RIVERS; AN ELECTROFISHING SURVEY OF THE ILLINOIS RIVER,
Illinois Natural History Survey, Havana. River Research Lab.
For primary bibliographic entry see Field 8I.
W77-03302

HYDROLOGY AND ENVIRONMENTAL ASPECTS OF ERIE CANAL (1817-99),
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 8B.
W77-03334

THE EFFECTS OF SEWAGE EFFLUENT ... WETLAND ECOSYSTEMS,
Michigan Univ., Ann Arbor.
R. H. Kadlec, C. J. Richardson, and J. A. Kadlec
Available from the National Technical Information Service, Springfield, VA 22161 as PB-249 ...
Price codes: A09 in paper copy, A01 in microfic...
Semi-Annual Report No. 4, December, 1975. ... p, 27 fig, 59 tab, 50 ref.

Descriptors: *Wetlands, *Sewage dispo... *Irrigation, *Nutrients, *Ecosystems, Biom... Simulation analysis, Plant growth, Sewage ... fluents, Statistical methods, *Michigan, W... pollution effects, Path of pollutants.

Ongoing studies of the effects of sewage efflu... in wetland ecosystems are reported, with part... lar emphasis on the nutrient status of the surf... and interstitial waters of peatlands in Michi... Specific topics covered include: the effect... simulated sewage effluent on the decomposit... nutrient status, and litterfall in a central Mich... peatland, the effects of simulated sewage efflu... on the growth and productivity of peatland pla... pilot scale irrigation experiments, a statistical a... ysis of seasonal changes in biomass (standing ... new growth) of selected wetland species a... fluenced by nutrient additions, and studies of ... solved nutrients in Michigan peatland. (Krea... FIRL)
W77-03354

RESIDUAL WASTE MANAGEM... RESEARCH AND PLANNING PROJECTS, ... TEMBER 1975,
Environmental Protection Agency, Washing...
D. C. Water Planning Div.
For primary bibliographic entry see Field 5B.
W77-03355

ASSESSMENT OF OFFSHORE DUMPING ... THE NEW YORK BIGHT, TECHNI... BACKGROUND: PHYSICAL OCEAN... RAPHY, GEOLOGICAL OCEANOGRA... AND CHEMICAL OCEANOGRAPHY.
National Oceanic and Atmospheric Admini... tion, Miami, Fla. Atlantic Oceanographic ... Meteorological Labs.
For primary bibliographic entry see Field 5B.
W77-03358

PRELIMINARY ASSESSMENT OF SUSPEC... CARCINOGENS IN DRINKING WATER: ... PORT TO CONGRESS.
Environmental Protection Agency, Washin...
D.C. Office of Toxic Substances,
For primary bibliographic entry see Field 5A.
W77-03360

THE IMPACT OF FARGO, NORTH DAKO... WASTE DISCHARGES ON THE INTERST... WATERS OF THE RED RIVER OF ... NORTH, SEPTEMBER 1969-APRIL 1970,
Federal Water Quality Administration, K... City, Mo.
For primary bibliographic entry see Field 5B.
W77-03361

EFFECT OF CALCIUM FROM THE WA... ENVIRONMENT ON TISSUE METABOLIS... PHOSPHATES IN ANODONTA CYGNEA... RUSSIAN),
Akademiya Nauk URSR, Kiev. In... Hidrobiologii.
V. D. Romanenko, N. P. Galagan, and V. D. Solomatina.
Gidrobiol Zh 11(3), p 32-37, 1975.

Descriptors: *Calcium, *Ions, *Metabo... *Mollusks, *Salt Tolerance, Dissolved ... Phosphorus, *Phosphates, Water pollutio... fects.

fiers: Anodonta cygnea, AtPase, Gills, opancreas, Mantle, Muscles, Phosphatase, regulation, U.S.S.R.

metabolism of A.cygnea is considered as ıced by an increased content of Ca in the Under experimental conditions considera- ıanges were observed in the content of l and inorganic P, ATPase and alkaline ıatase activity of hepatopancreas, muscles pecially mantle and gills. The data testify to ential effect of Ca+2 from the water on rgetic reactions responsible for osmoregula- d other processes connected with salt adap- of the mollusks.
3366

RIMENTAL STUDIES ON MATERIAL SACTIONS BETWEEN MUD AND R OF THE GNADENSEE,
Banoub.
erhandlungen Internationale Vereinigung logie, Vol. 19, Part II, p. 1263-1271, 1975. 7 ab., 28 ref.

ptors: *Mud-water interfaces, horus, Lakes, Laboratory tests, Cycling ts, Sampling, Phosphates, Water pollution

iers: *Gnadensee, Reeds.

lease rates of phosphorus from muds of the ominated banks of the Gnadensee see) are estimated. Results revealed that ease of phosphorus from both aerobic and bic conditions followed a sigmoid trend due ily to reactive phosphorus. Organic orus showed an irregular release which did ceed a value of 300 ug P/l and its variations ot be correlated with the experimental con- . Reactive phosphorus increased steadily g equilibrium levels depending on the rate pling, temperature, and the experimental ons. The highest concentration reached was g P/l under combined anaerobic condition C. At high concentrations of phosphorus was an apparent increase of organic orus due to the method of calculation. The nd average PO4-P release at the four tem- es used to incubate the mud showed an al- near relation with temperature up to 15 C. eration, PO4-P decreased to a minimum, creased steadily again in the presence of ox- naerobic conditions also caused a decrease -P in water above the mud. Leachates from osing reed stems caused an increase in and reactive iron in the water phase. Iron to mud cylinders under anaerobic condi- owed no appreciable effects on phosphate dose of 10 mg Fe/l was reached. Doses of) mg Ca/l had a slight effect on phosphate. 00 mg Ca/l caused apparent loss to the uedtke-Wisconsin)
370

T ON POLLUTION IN LAS VEGAS AND LAS VEGAS BAY.
Water Pollution Control Administration, ati, Ohio. Div. of Technical Services.
le from the National Technical Informa- vice, Springfield, VA 22161 as PB-246 653, des: A03 in paper copy, A01 in microfiche. 1967. 24 p. 10 tab, 2 fig, append.

tors: *Water pollution sources, *Waste ollution), *Public health, Waste water nt, Effluents, Recreation, Coliforms, Sal- , Aquatic bacteria, Sewage bacteria, Productivity, Phosphorus, Nitrogen, o River basin, Hoover Dam, Impound- *Nevada.
ers: *Lake Mead(Nev), Las Vegas(Nev), County(Nev), Las Vegas Bay(Nev), Beach(Nev), Las Vegas Wash(Nev).

Algae growths resulting from phosphorus and other nutrient discharges from the city and county sewage treatment plants at Las Vegas, Nevada is producing an objectionable aesthetic condition which, if allowed to continue unabated, will destroy the recreational value of the Las Vegas Bay area of Lake Mead in the Colorado River basin. To maintain algae counts of less than 2,000/ml throughout the area, sewage treatment plants should not discharge a concentration of more than 1.2 mg/l in their effluents. This standard would require 90-92% reductions in effluent phosphorus concentrations for the two sewage treatment plants. Excessive densities of coliform were discovered in the effluents of both sewage plants and salmonella in the Las Vegas city effluent and in the Las Vegas Wash region of the lake, indicating a need to improve chlorination facilities. However, coliform levels throughout Las Vegas Bay and in the Boulder Beach area are well below the levels of concern for direct contact water activities. At Boulder Beach, increased counts are the result of augmented bathing activity rather than pollution discharges from outside the area. Concentrations of metals and organic pesticides in the Las Vegas Bay area are both below levels of concern. (Harris-Wisconsin)
W77-03371

A REVIEW OF CLUSTERING TECHNIQUES WITH EMPHASIS ON BENTHIC ECOLOGY,
Portland State Univ., Oreg. Urban Studies Center.
For primary bibliographic entry see Field 5A.
W77-03372

EVALUATION OF LAKE MILNER WATER QUALITY MODEL,
Environmental Protection Agency, Seattle, Wash.
For primary bibliographic entry see Field 5B.
W77-03373

THE PRIMARY PRODUCTION OF THE PERIPHYTON ASSOCIATION OEDOGONIO-EPITHEMIETUM LITORALAE,
R. Bohr, and M. Luscinska.
In: Verhandlungen Internationale Vereinigung Limnologie, Vol 19, Part II, p 1309-1312, 1972. 1 fig, 5 ref.

Descriptors: *Primary productivity, *Periphyton, Lakes, Biomass, Photosynthesis, Chlorophyta, Cladophora, *Eutrophication, Water pollution effects.
Identifiers: *Lake Jeziorak(Poland), *Lake Tynwald(Poland), *Oedogonio-Epithemietum litoralae, *Poland.

The association Oedogonio-Epithemietum litoralae, often found in eutrophic lakes in Northern Poland, was studied in Lake Jeziorak and Lake Tynwald. The association developed poorly in Lake Jeziorak, with a low percentage of green algae, a dominance of diatoms, and a regular expansion of bryozoa in summer. Assimilation of periphyton communities was estimated at an average of 0.88 kcal/sq m/day. A more detailed examination of periphyton primary productivity in Lake Tynwald resulted in the following conclusions: (1) Cladophora is a biennial component able to survive the winter and yield considerable amounts of biomass on last years reed stem in the spring, though a rather small production, (2) at the same time, populations of filamentous green algae appear on the new substrate supplied by the growing young reed blades, yielding a biomass of 10.9 kcal/sqm with a high production intensity, (3) the dominance of the filamentous green algae persists throughout the summer, constituting 92% of the total biomass, (4) in autumn, the external climatic conditions have a reducing effect on the production, and (5) the total increment or net production of organic substance produced by photosynthesis during the vegetative season was estimated to be 857 kcal/sqm, the coefficient P/B was 15, and the turnover was 16 days. (Luedtke-Wisconsin)
W77-03374

THE IMPACT OF A FOREST FIRE ON A WILDERNESS LAKE IN NORTHEASTERN MINNESOTA,
Minnesota Univ., Minneapolis. Limnological Research Center.
For primary bibliographic entry see Field 5B.
W77-03375

THE PRIMARY PRODUCTION OF LAKE SIBAYA, KWAZULU, SOUTH AFRICA,
B. R. Allanson, and R. C. Hart.
In: Verhandlungen Internationale Vereinigung Limnologie, Vol. 19, Part II, p. 1426-1433, 1975. 6 fig., 1 tab., 6 ref.

Descriptors: *Photosynthesis, Aquatic algae, Productivity, Lakes, Africa, Tropical regions, *Primary productivity, Cycling nutrients, Eutrophication, Carbon, Waste assimilative capacity.
Identifiers: *Lake Sibaya(South Africa), Warm water lakes, Talling-Rodhe-Vollenweider model, *Carbon 14.

Carbon 14 uptake by the algal community of Lake Sibaya, South Africa was studied during 1973-1974, and the results were compared with studies of other warm water lakes. Carbon assimilation in Lake Sibaya, though showing a cool season depression, is largely light limited. The appearance of the photosynthetic rate curves with depth and season led to an attempt to use the Talling-Rodhe-Vollenweider model to fit the pelogic photosynthesis in response to light attenuation. A graphical solution, using Rodhe's methods is given, and confirms the adequacy of the model in determining the photosynthetic integral. The extinction of white light gave a closer fit to the observed value than the extinction of the most penetrating component in the lake, green light. It is concluded on the basis of these results, together with those of prior work, that Lake Sibaya behaves photosynthetically in a similar way to many other lakes. Comparison with other lakes show that Lake Sibaya has the lowest maximal productivity of tropical lakes so far studies. Results of the study are also considered with respect to Brylinsky and Mann's analysis of factors governing productivity in lakes and reservoirs. (Luedtke-Wisconsin)
W77-03376

LAKE PHOSPHORUS LOADING GRAPHS: AN ALTERNATIVE,
Environmental Protection Agency, Corvallis, Oreg. Eutrophication and Lake Restoration Branch.
D. P. Larsen, and H. T. Mercier.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-243 869, Price codes: A03 in paper copy, A01 in microfiche. Working Paper No. 174, July 1975. 30 p. 4 tab., 5 fig., 22 ref.

Descriptors: *Analytical techniques, *Trophic level, *Phosphorus, *Eutrophication, Oligotrophy, Lakes, Lake stages, Graphical analysis, Flow characteristics, Hydraulics, Model studies, Waste assimilative capacity.
Identifiers: *Phosphorus loading graphs, Phosphorus retention capacity, Phosphorus mass balance models, Hydraulic washout coefficient, Areal hydraulic load.

An improved analytical technique is described by which predictions can be made as to a lake's trophic state and changes in the trophic state caused by variations in the phosphorus level. The new technique is a graph of mean influent phosphorus concentration compared with phosphorus retention capacity, in which a relationship is expressed between phosphorus supply and hydraulic flow, on one hand, and the resultant trophic stae of lakes. The graph takes into account a relationship derived directly from the steady state solution of a simple phosphorus mass balance model, and predicts trophic state and

changes in trophic state caused by manipulating influent phosphorus concentrations and/or manipulating the assimilative capacity of a lake for phosphorus. The technique is intended as an alternative to phosphorus loading graphs, some of which have been developed from mass balance models that describe the relationship between lake phosphorus concentrations and the amount of phosphorus entering the lake. Empirical expressions are provided for use in studies of oligotrophic lakes, where predictions are to be made relating phosphorus retention capacity to areal hydraulic load or hydraulic washout coefficient. (Harris-Wisconsin)
W77-03377

DELAWARE 1975 STATE WATER QUALITY INVENTORY,
Department of Natural Resources and Environmental Control, Dover, Dela. Div. of Environmental Control.
For primary bibliographic entry see Field 5G.
W77-03378

WINTER CONDITIONS IN TE NEW YORK BIGHT, 1973-1974.
Grumman Ecosystems Corp., Bethpage, N. Y.; and Lawler, Matusky and Skelly Engineers, Tappan, N. Y.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-245 191, Price codes: A10 in paper copy, A01 in microfiche. Report No. NYSERDA-7507, September 1974. 223 p. 42 fig., 69 tab., 8 append., 81 ref.

Descriptors: *Oceanography, *Marine biology, *Nuclear powerplants, *Offshore platforms, Atlantic Ocean, Northeast U.S., Hydrography, Hydrologic aspects, Nannoplankton, Seasonal, Temperature, Isotherms, Thermal pollution, Water pollution sources, Shores, Sea water, Physical properties, Environmental effects, Chemical analysis, Chemical properties, Sediments, Benthos, Winter, Primary productivity, Fish eggs, Phytoplankton, Chlorophyll, Zooplankton.
Identifiers: *New York Bight, Halocline, Pycnocline.

Initial results and analysis of an oceanographic and marine biological study of an 800 sq. mile area extending 15 miles offshore south of Long Island, New York--related to the proposed offshore siting of nuclear power plants--indicate: (1) the waters are generally well-mixed, isothermal, strongly driven by winds as well as tides, with typically highly-productive inshore marine biological communities; (2) despite extreme hydrological variability related to significant geographic differences in the study area, and taking into account anomalies in the vicinity of offshore dump sites, all biological communities follow a well-defined seasonal succession; (3) most of the chemical constituents show geographical as well as temporal variation, but ammonia was generally concentrated near the bottom; (4) Hudson River waters probably cause a pronounced halocline and pycnocline developed by late January in the northwest quadrant, and vertical gradients of salinity and density are apparent on all edges of the area by March; (5) nannoplankton predominates among the algal standing crop and primary productivity in November-December but is equally divided between net and nannoplankton by March, with larger diatoms assuming dominance; (6) zooplankton and fish eggs are minimal in January-February and most abudnant in March. (Harris-Wisconsin)
W77-03380

ASSATEAGUE ECOLOGICAL STUDIES.
Maryland Univ., Solomons. Natural Resources Inst.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-245 131, Price codes: A19 in paper copy, A01 in microfiche. Report No. ASIS-01-75, Part I, October, 1970. 428 p. 106 fig., 44 tab., 710 ref., 1 append. 14-10-5-950-36.

Descriptors: *Barrier islands, *Census, *Maryland, *Virginia, Atlantic Ocean, Environmental effects, Sediment distribution, Currents(Water), Geology, National seashores, Coasts, Data collections, Dredging, Climatology, Primary productivity, Salt marshes, Tidal effects, Benthos, Fish populations, Crustaceans, Commercial fishing, Groundwater resources, Bibliographies, Ecology.
Identifiers: *Assateague Island, *Chincoteague Bay.

This report is a compilation of basic biological, geological, and ecological information for the area surrounding Assateague Island, and is intended along with Parts II and III to facilitate management of this barrier island seashore with particular reference to proposed dredging. The geological history, climatology, sea dynamics, and freshwater sources of the Island are described. Sedimentation distribution and yearly production rates of three major primary productivity sources in Chincototeague Bay, planktonic algae, underwater rooted aquatic plants, and spartina marshes were determined. Groups or communities of benthos in the Bay were identified and related to environmental parameters such as depth and sediment characteristics with particular attention given to the commercially important hardshelled clam. Chincoteague crustacea and fish populations were also surveyed. The development of the Chincoteague Bay commercial fishery in terms of catch records, fishing methods, laws, and research efforts are reviewed, and an extensive bibliography of natural, political, and historical aspects of Assateague Island and vicinity is included. Part II deals with the environment threats due to dredging, insect control and land disturbance, and Part III provides a suggested land use plan. (Luedtke-Wisconsin)
W77-03381

WATER QUALITY IN THE CALUMET AREA. CONFERENCE ON POLLUTION OF LOWER LAKE MICHIGAN, CALUMET RIVER, GRAND CALUMET RIVER, LITTLE CALUMET RIVER, AND WOLF LAKE, ILLINOIS AND INDIANA.
Department of Health, Education, and Welfare, Washington, D.C. Technical Committee on Water Quality.
For primary bibliographic entry see Field 5B.
W77-03382

A PRELIMINARY STUDY OF THE TASTE AND ODOR PROBLEMS IN GRAND LAKE, OHIO AND THE WABASH RIVERS, INDIANA,
Federal Water Pollution Control Administration, Evansville, Ind. Ohio River Basin Project.
M. A. Anderson, and J. H. Adams, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-245 745, Price codes: A05 in paper copy, A01 in microfiche. October 1969. 80 p. 26 tab., 10 fig., 16 ref., 1 append.

Descriptors: *Taste, *Odor, *Potable water, Water pollution effects, Organoleptic properties, Taste-producing algae, Odor-producing algae, Water properties, Cyanophyta, Actinomycetes, Indiana, Illinois, Ohio.
Identifiers: *Grand Lake(Ohio), *Wabash River basin, Celina(Ohio), Terre Haute(Ind), Huntington(Ind), Mt. Carmel(Ill), Aphanizomenon, Anacystis, Synedra, Scenedesmus, Cyclotella.

Deletrious olfactory and gustatory effects to the drinking water supply were caused largely by certain blue-green algae and by actinomycetes at Grand Lake near Celina, Ohio, at Huntington and Terre Haute, Indiana and at Mt. Carmel, Illinois, according to results of a 1967-68 study to determine the extent to which these organisms might be responsible for producing noxious tastes and odors in the lake and along the Wabash Rive
Among the algae most responsible for t
problems at Grand Lake are Aphanizomeno
Anacystis, Synedra and Scenedesmus. Tastes a
odors at Huntington and Terre Haute Indiana a
apparently related to the diatom Cyclotella. A
tinomycetes contributed only a minor share to t
taste and odor problem of water in Huntingto
but the organism was especially significant
Grand Lake during a period of high lake levels
February and March and throughout the spring
Terre Haute. High actinomycete counts are large
responsible for springtime taste and odor proble
at Mt. Carmel, especially during peak periods
February and May. Most of the actinomycetes
the river are flushed from pools and soils on t
floodplain, and their number in the river depe
mostly on the amount of flooding that occu
(Harris-Wisconsin)
W77-03384

POLLUTION OF INTERSTATE WATERS
THE LOWER COLUMBIA RIVER BO
NEVILLE DAM TO CATHLAMET, WASHIN
TON.
Public Health Service, Portland, Oreg. Div.
Water Supply and Pollution Control.
For primary bibliographic entry see Field 5B.
W77-03385

AQUATIC FIELD SURVEY AT IOWA AR
AMMUNITION PLANT,
Environmental Control Technology Corp., A
Arbor, Mich.
R. L. Weitzel, P. B. Simon, D. E. Jerger, and J.
Schenk.
Available from the National Technical Infor
tion Service, Springfield, VA 22161 as AD-A
300, Price codes: A08 in paper copy, A0
microfiche. August 1975. 145 p, 25 tab, 23 fig
ref, 4 append. DAMD 17-74-C-4124.

Descriptors: *Chemical wastes, *Indus
wastes, *Streams, Military reservations, W
pollution sources, Water pollution effects, A
bic conditions, Aerobic bacteria, Sediments,
dustrial plants, Factories, Periphyton, *Iowa.
Identifiers: *Trinitrotoluene(TNT), *Army
munition Plant(Iowa), Long Creek(Iowa), B
Creek(Iowa), Spring Creek(Iowa).

An investigation of aerobic transforma
products of trinitrotoluene (TNT) and their fa
aquatic and sedimentary systems in three re
ing streams at a government-owned high explo
munitions plant near Burlington, Iowa shows
ous periphyton-related changes. Minor shift
periphyton diatom species were found in all t
stream systems, corresponding to simultan
variations in nutrient levels and TNT concen
tions in the aqueous environment. Periph
biomass, organic production, periph
chlorophyll-A and chlorophyll-A productio
generally increase downstream from the plant.
autotrophic index of the periphyton commu
shows a shift to autotrophic commun
downstream in two of the creeks. Certain mil
munitions-related trace pollutants are preser
low but measurable levels in all three stre
Recommendations include requests for surve
of anaerobic transformation of TNT, for sam
of TNT processing line effluent, to evaluate
centration characteristics of TNT on natural
sus artificial substrates, and for expanded be
macroinvertebrate studies to be performed i
vicinity of maximum TNT laden sedim
(Harris-Wisconsin)
W77-03386

SEASONAL INTERACTIONS AM
ESTUARINE PRIMARY PRODUCERS
HERBIVORES,
Maryland Univ., Solomons, Md. Chesap
Biological Lab.
For primary bibliographic entry see Field 2L.
W77-03387

STIGATIONS ON THE ROLE OF DIS-ED ORGANIC MATTER IN DETERMIN-ECOSYSTEM STRUCTURE AND FUNC-THE PLANKTON AND OHETEROTROPHY,
gan State Univ., East Lansing. Dept. of y.
McKinley.
ble from the National Technical Informa-ervice, Springfield, VA 22161 as COO-159 Price codes: A07 in paper copy, A01 in iche. Ph.D. Thesis, 1975, 129 p, 12 fig, 2 tab, nd, 137 ref. GB-40172;E(11-1)-1599, C00-5; GB-15665; GB31018X.

ptors: *Phytoplankton, *Organic matter, ystems, Absorption, Succession, Dominant sms, Trophic level, Plankton, Absorption, igan.
iers: *Photoheterotrophy, heterotrophy, Heterotrophy, trophic uptake, Dissolved organic matter, nce Lake(Mich).

s of a study in which photoheterotrophic up-a southwestern Michigan hard-water lake ual to 67.6% of the chemoheterotrophic ac-on a comparative annual basis for the t period imply that research of trophic uptake utilizing dark techniques eriously underestimate total activity. The zone of Lawrence Lake underwent simul-s monitoring for uptake of glucose and for ithotrophic carbon fixation. Light and dark uptake of organic and inorganic carbon was red, revealing that light bottle uptake of or-naterial was significantly greater than dark uptake on the average. The patterns of the terotrophic activities demonstrate that the ses are separated in space and time on a as well as a seasonal basis. eterotrophic activity generally was skewed the morning and mid-day, with minating activity shifting to increasing in the water column as the day progressed. heterotrophic activity generally increased hout the daylight period and with depth. trophic fixation as compared with thotrophic carbon fixation indicates that eterotrophy may contribute significant ts of carbon to photosynthetic organisms conditions unfavorable to inorganic carbon n, such as low irradiance at depth and under er. (Harris-Wisconsin)
389

NSE OF DAPHNIA POPULATION SIZE GE STRUCTURE TO PREDATION,
gton Univ., Seattle. Dept. of Zoology.
mary bibliographic entry see Field 2H.
390

EMOVAL FROM A LAKE BOTTOM,
Herman Development Association, Inc., n, S. Dak.
hurchill, C. K. Brashier, and C. S. Johnson.
le from the National Technical Informa-rvice, Springfield, VA 22161 as PB-241 250, des: A03 in paper copy, A01 in microfiche. No. EPA 660/3-74-017, February 1975. ical Research Series. 37 p., 6 fig, 2 tab, 4 ppend. 1BA031. 16010 ELF.

tors: *Dredging, *Eutrophication, ts, Phosphorus, Sediment control, t removal, *South Dakota, Sediments, *Silts, Lake beds, *Lake sediments.
ers: *Lake restoration, Lake Herman(SD), noval.

e restoration program, dredging was used ve 62,000 cubic yards of silt from a 4.2 hec-a of Lake Herman, South Dakota during mers of 1970, 1971 and 1972. The silt was rted as slurry via pipeline to a deposit area t to the lake. Water removed by the process drained by gravity along a gradual slope, where it dropped its silt, lost its nutrients, then returned by pipe to the lake. Slurry water was rich in nutrients, particularly total phosphates. Orthophosphats, however, were uniformly lower in the slurry, in the deposit area, and in the return pipe than they were in the lake water at the point of dredging. Water from the deposit area was less basic and contained less nutrients than lake water, while an increase in vegetation occurred in the deposit site after deposition began. There was no significant change in organism or nutrient levels, except for phosphorus which increased shortly after dredging began. Hardness, silica and turbidity also increased. Core sampling revealed that recently deposited silt was much more fertile than earlier deposits. Greenhouse chrysanthemums grown in silt from the disposal site exhibited larger stems, leaves and flowers, but poorer root systems than those grown in commercial preparations. (Luedtke-Wisconsin)
W77-03392

METHODS OF DISSOLED OXYGEN BUDGET ANALYSIS FOR ASSESSING EFFECTS OF DREDGED MATERIAL DISPOSAL ON BIOLOGICAL COMMUNITY METABOLISM,
Virginia Univ., Charlottesville, Va.
G. M. Hornberger, and M. G. Kelly.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-018 340, Price codes: A05 in paper copy, A01 in microfiche. Report No. D-75-3, U.S. Army Engineer Waterways Experiment Station, November 1975. 98p, 3 fig, 6 tab, 19 ref, 4 append. DACW-39-74-C-0030.

Descriptors: *Methodology, *Aquatic productivity, *Dissolved oxygen, *Monitoring, Environmental effects, Computer programs, Mathematical studies, Fourier analysis, Data processing, Dredging.
Identifiers: Oxygen mass balance equation, Dredge disposal.

A method for automatically monitoring biological productivity and the dissolved oxygen budget of aquatic systems with the intent of detecting the biological effects of dredging and dredge disposal is described. Three computer programs for calculating a continuous function (a Fourier series) describing net community productivity using measurements of dissolved oxygen concentration, temperature, and salinity with a solution to the oxygen mass balance equation, were developed. These programs pertain to calculation of (1) temporal variation of net productivity in flowing water (rivers), (2) depth-averaged net productivity for a standing water body, and (3) the depth distribution of net productivity in standing waters. These methods are particularly suited for use with continuous automatic data recording systems, and can be used for assessing environmental effects of many engineering activities. Major assumptions in the development of the dissolved oxygen budget include a constant diffusion rate for the 24-hour period, night-time respiration similar to daytime respiration, one gram of biomass produced for each gram of oxygen released, no turbulent circulation patterns, and similar metabolic history of water entering and leaving an area. The required computer programs are presented and their use discussed. (Luedtke-Wisconsin)
W77-03393

TOXICITY OF AMMONIA TO ALGAE IN SEWAGE OXIDATION PONDS,
Hebrew Univ., Jerusalem (Israel). Human Environmental Sciences Lab.
For primary bibliographic entry see Field 5D.
W77-03413

HEAT INACTIVATION OF POLIOVIRUS IN WASTE WATER SLUDGE,
Sandia Labs., Albuquerque, N. Mex.
R. L. Ward, C. S. Ashley, and R. H. Moseley.
Applied and Environmental Microbiology, Vol 32, No 3, p 339-346, September, 1976. 3 fig, 5 tab, 20 ref.

Descriptors: *Waste water treatment, *Pollutant identification, *Heat, *Viruses, *Sludge, Anaerobic digestion, Waste dilution, Temperature.
Identifiers: *Poliovirus(Inactivation).

The study was designed to determine the effects of raw and anaerobically digested sludge on the rate of heat inactivation of poliovirus. Three types of poliovirus were grown and plaqued on a line of HeLa cells. A 10-fold dilution of virus was placed in the sludge samples at room temperature and then flamed to eliminate infectious virus that may have remained above the water line in the incubation bath. Then they were incubated at specified times and temperatures, placed in an ice bath and analyzed by the SDS-sonication procedure. Results showed that viruses are readily inactivated by heat, though the inactivation rate is most dependent on environment. Raw sludge proved consistently protective of poliovirus during heat treatment and digested sludge had erratic effects. The latter, when dilute and at low temperatures, protects the virus but, at high temperatures and concentrations, loss of viral plaque-forming units is more rapid. The difference between the two sludge types is attributed to the acquisition of virucidal activity during digestion. It seemed that a virucidal agent associated with the liquid component of sludge is produced during digestion. Solids of raw sludge are protective during heat inactivation, and this can be reversed by the addition of the liquid fraction of digested sludge. (Collins-FIRL)
W77-03448

MUSSEL TEST FOR BIOLOGICAL CONTROL OF WATER POLLUTION (KAGYLO-TESZT VIZSENNYEZESEK BIOLOGIAI HATASANAK VIZSGALATARA),
For primary bibliographic entry see Field 5A.
W77-03454

THE AERIAL PHOTO-WATER QUALITY LINK.
For primary bibliographic entry see Field 5A.
W77-03471

PHOTOLYSIS OF 5-CHLOROURACIL IN NATURAL WATERS,
Oak Ridge National Lab., Tenn. Environmental Sciences Div.
For primary bibliographic entry see Field 5B.
W77-03477

RISK OF COMMUNICABLE DISEASE INFECTION ASSOCIATED WITH WASTE WATER IRRIGATION IN AGRICULTURAL SETTLEMENTS,
Hadassah Medical School, Jerusalem (Israel). Environmental Health Lab.
E. Katzenelson, I. Buium, and H. I. Shuval.
Science, Vol. 194, No. 4268, p 944-946, November, 1976. 1 fig, 1 tab, 7 ref.

Descriptors: *Waste water treatment, *Sewerage, *Pollutant identification, *Infection, *Human diseases, Waste water(Pollution), Irrigation practices, Irrigation water.

Statistics from 207 kibbutzim (population 82,825) were used to compare morbidity rates between users and nonusers of waste water for irrigation. Data was collected primarily for waterborne diseases such as shigellosis, salmonellosis (not including typhoid fever which was considered separately), infectious hepatitis, and influenza. Streptococcal infections (including scarlet fever) and tuberculosis were chosen as controls. Disease incidence was two to four times higher in settlements using sewage effluent as irrigation water. Though the incidence of clinical influenza was

twice as high in sewage-irrigated settlements, there was no difference in the incidence of laboratory diagnosed influenza cases. There was no significant difference in the incidence of the diseases not associated with sewage. Since sewage irrigation is not used during the winter, the similarity of mortality rates supports the hypothesis that there is a link between sewage irrigation and enteric disease incidence. Geographical differences and pathogen transmission by sewage-irrigated crops have been discounted. It was suggested that pathogens from waste water irrigation areas could reach kibbutz populations through alternate pathways, on bodies and clothes of irrigation workers returning to the community. The precaution of waste water treatment, including bacterial and viral disinfection of all waste water used in the vicinity of settlements or residential areas, is urged. (Collins-FIRL)
W77-03485

EUTROPHICATION AND RESTORATION OF LAKES RECEIVING NUTRIENTS FROM DIFFUSE SOURCES ONLY,
R. Pechlaner.
Verhandlungen Internationale Vereiningung Limnologie, Vol 19, Part II, p 1272-1278, 1975. 3 fig, 1 tab, 13 ref.

Descriptors: *Nutrient removal, *Water management(Applied), *Eutrophication, Water quality control, Artificial recharge, Foreign countries, Limnology, Recreation wastes, Water pollution sources, Europe, Oxygenation, Phosphorus, Lakes.
Identifiers: *Olszewski tubes, *Lake restoration, *Artificial aeration, Water restoration, Nonpoint-source pollution, Piburger See(Austria), Reither See(Austria), Hechtsee(Austria), Water renewal.

Whereas sewage diversion and other forms of lake sanitation are useful in efforts to reduce, stop or even reverse eutrophication, such prophylactic measures have little effect on nutrients that originate from nonpoint sources; in the latter case, priority must be given to lake restoration methods such as the artificial aeration by means of hypolimnetic outlets (Olszewski tubes). Lake restoration activities are described for three stratified recreational lakes in Tyrol, Austria which are characterized by some agricultural land use, sparse populations and intensive tourism. Olszewski tubes were installed at Piburger See, Reither See and Hechtsee. Secchi disc transparancy, oxygen stratification, phosphate concentrations, phytoplankton measurements, algae productivity and other eutrophication indices have been made before and after mounting of the Olszewski tubes. The tubes remove anaerobic water and with up to 300 micrograms per liter total phosphorus from the deepest part out of the lake. Efforts have been markedly successful in Piburger See and Reither See, but effects on lake stratification have not yet been observed in Hechtsee. (Harris-Wisconsin)
W77-03536

PHYTOPLANKTON RESPONSE TO PHOSPHORUS AND SILICA ENRICHMENTS IN LAKE MICHIGAN,
Michigan Univ., Ann Arbor. Great Lakes Research Div.
C. L. Schelske, M. S. Simmons, and L. E. Feldt.
Verhandlungen Internationale Vereiningung Limnologie, Vol 19, Part II, p 911-921, 1975. 3 fig, 7 tab, 13 ref. AEC C00-2003-24, NSF GA-4507.

Descriptors: *Lake Michigan, *Phytoplankton, *Nutrients, *Primary productivity, Phosphorus, Silica, Photosynthesis, Chlorophyll, Diatoms, Dominant organisms, Rivers, Eutrophication.
Identifiers: Muskegon River(Mich), Grand River(Mich), Kalamazoo River(Mich), St Joseph River(Mich).

Results of experiments made to study effects of small additions of phosphorus on natural Lake Michigan phytoplankton assemblages and the effects of silica and river water when combined with additions of phosphorus are described. Four locations were used along the southeastern shore of the lake, offshore near the Muskegon, Grand, Kalamazoo and St. Joseph rivers. Water pumped from the lake was treated with different combinations and levels of phosphorus, silica, and river water. The added phosphorus increased rates of carbon fixation and chlorophyll production, and in some experiments the same effect was achieved through addition of the silica and river water dilutions. In the Muskegon River experiment, phosphorus additions more than doubled the rate of carbon fixation and production of chlorophyll. Without added phosphorus there was no silica-induced effect, but river water increased the rate of carbon fixation more than two-fold. Somewhat similar results were obtained for phosphorus additions on carbon fixation and chlorophyll production in the other three stations, but greater variations were shown for the other experiments. The results confirm the conclusion that the sensitivity of Lake Michigan phytoplankton to small increases in nutrient loading is great. (Harris-Wisconsin)
W77-03537

LIMNOLOGICAL CHARACTERISTICS OF STRIP MINE PONDS IN NORTHWESTERN COLORADO, U.S.A.,
E. B. Reed.
Verhandlungen Internationale Vereiningung Limnologie, Vol 19, Part II, p 856-865, 1975. 10 fig, 6 ref.

Descriptors: *Strip mine lakes, *Food chains, *Fisheries, Strip mines, Rainbow trout, Ecosystems, Productivity, Fish establishment, Fish stocking, Fish management, Sport fishing, *Colorado.
Identifiers: Lake restoration, Water restoration.

Two Routt County, Colorado high-altitude strip mine ponds resulting from accumulation of water in surface excavation sites, were studied for two years to acquire water quality information anticipatory to establishing recreational fisheries. At Camilletti and Salamander Ponds, studies were made of physical, chemical and hydrobiological characteristics, including food web components. Salamander Pond's food web includes primary production of benthic algae and pondweed, detritus, insects and zooplankton, salamander and frogs, and water snake. The Camilletti food web is based on primary production of Chara, detritus, zooplankton, insects, snails, amphipods, and rainbow trout. In the Camilletti food web--unlike Salamander's--there was a distinct important link in the food chain that joins zooplankton production to higher-level production. Productivity in Salamander Pond could be improved by introducing a small number of catchable-size trout each spring. These would replace salamanders and water snakes at the apex of the food web in the pond. Temperature and oxygen conditions apparently permit rainbow trout survival in Camilletti Pond during the winter, but in Salamander Pond almost certain winter-kill means that a fishery could be maintained only on a put-and-take basis. (Harris-Wisconsin)
W77-03538

SIMULATION OF PESTICIDE MOVEMENT ON SMALL AGRICULTURAL WATERSHEDS,
ESL, Inc., Sunnyvale, Calif.
For primary bibliographic entry see Field 5B.
W77-03540

IDAHO ENVIRONMENTAL OVERVIEW,
Consulting Engineers, Inc., Boise, Idaho.
For primary bibliographic entry see Field 6G.
W77-03557

DETERMINATION OF MAXIMUM PERMISSIBLE LEVELS OF SELECTED CHEMICA THAT EXERT TOXIC EFFECTS ON PLAN OF ECONOMIC IMPORTANCE IN ILLINOIS
Southern Illinois Univ., Carbondale.
For primary bibliographic entry see Field 5A.
W77-03565

THE IMPACT OF INTENSIVE APPLICATI OF PESTICIDES AND FERTILIZERS ON DERGROUND WATER RECHARGE AR WHICH MAY CONTRIBUTE TO DRINK WATER PROBLEMS,
Environmental Protection Agency, Washing D.C. Office of Toxic Substances.
For primary bibliographic entry see Field 5B.
W77-03567

EXPERIMENTAL SUBSTANTIATION OF MAXIMAL PERMISSIBLE CONCENTRATI OF TRIETHANOLAMINE, AMMONIUM CALCIUM SALTS OF ALK BENZOSULFATES IN WATER BODIES, RUSSIAN),
Nauchno-Issledovatelskii Institut Epidemiol Mikrobiologii, Lvov (USSR).
For primary bibliographic entry see Field 5B.
W77-03586

WATER QUALITY, PLANKTON EUTROPHICATION OF BERGSVAT EIKEREN AND FISKUMVATNET, S. NORW (IN NORWEGIAN),
Norsk Institutt for Vannforskning, Blindern.
J. Knutzen.
Blyttia 32(3), p 145-154, 1974.

Descriptors: *Water quality, *Plan *Eutrophication, *Distrophy, *Lakes, *Nutri Testing procedures, Chemical analysis, sampling, Phosphorus compounds, Protozoa, Crustaceans, Biological communiti
Identifiers: Rotatoria, Criteria, Bergsv Eikeren, Fiskumvatnet, *Norway.

On the basis of chemical and biological analy water samples and net hauls from Aug. 1969, quality and status with regard to eutrophic were tentatively evaluated. Bergsvatnet was to be typically dystrophic-eutrophic, wh Eikeren and Fiskumvatnet were characteriz lower concentrations of P compounds and plankton (algae, protozoa, Rotatoria, crust populations (Secchi reading 10 m in Eikeren) of plankton indices and indicator specie discussed, the data illustrating the importa taking into account introduction of species other lakes and the quantitative aspects of co nity structure. The future development oligotrophic Eikeren (depth 154 m, surface a km2) is considered. Due to the possibly long tion time of the trophogenic layer, it is also ble that Eikeren is more vulnerable than deducted from comparisons with nutrient l in most eutrophic lakes. (The theoretical ret time of the total volume is about 12 yr.) T vantages and difficulties of replacing loadi unit surface area with more relevant crite briefly summarized, with emphasis on such as length of summer stagnation period, of compensation point in relation to the mocline, and retention time of the prod layer.--Copyright 1976, Biological Abstracts, W77-03595

5D. Waste Treatment Processes

AN EVALUATION OF AQUEOUS CATALYTIC OXIDATION,
Delaware Univ., Newark. Dept. of Chemic gineering.
J. R. Katzer, H. H. Ficke, and A. Sadana.

al Water Pollution Control Federation, Vol. o. 5, p 920-933, May 1976. 5 fig, 5 tab, 49 ref. T A.027-DEL(3).

iptors: *Catalysts, *Phenols, *Oxidation, omic feasibility, *Evaluation, *Waste water ent, Kinetics, Chemical reaction, Industrial s, Economics.

fiers: *Process design, *Catalytic oxidation, us phase oxidation.

iterature suggests aqueous-phase catalytic ion as a potential wastewater treatment que but provides insufficient data to evalu- potential applicability. The complete oxida- phenol in aqueous solution over supported r oxide was studied in a one-liter autoclave conditions of practical interest. Rates were strated to be rapid. Rate data obtained were o design and evaluate an aqueous-phase ic oxidation process for treating wastewater a catalytic cracking unit and from a coke Aqueous-phase catalytic oxidation appears titive with other physical-chemical treat- techniques, particularly for wastewater s containing high concentrations of or- , and appears to warrant further considera-

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TMENT OF LIVESTOCK WASTES BY A IERED LANDSCAPE WATER RENOVA- SYSTEM,
are Univ., Newark. Dept. of Agricultural ering.
Ritter, and R. P. Eastburn.
anaging Livestock Wastes, (1975). Con- e Proceedings of 3rd International Symposi- Livestock Wastes. Published by the Amer- ociety of Agricultural Engineers, St. Joseph, an. p 572-575. 8 tab, 4 ref. OWRT A-030-).

otors: *Farm wastes, *Nigrogen, horus, Chemical oxygen demand, Denitrifi- Soil properties, Land disposal, Soil types, Regression analysis, *Waste water treat-

ers: Barriered landscape water renovation

atory study was conducted to evaluate soil nd depth of soil through which livestock percolate for a barriered landscape water ion system. Anaerobically treated dairy was applied to Matapeake silt loam, Sas- sandy loam, and Evesboro loamy sand in umns of 3, 5, 6 and 8 ft. lengths at loading 1.25 and 2.5 cm per day. In all soil columns osphorus was reduced from 44 mg/l to 0.5 less. Ammonia removal varied with soil hemical oxygen demand was reduced by 95 or more. Laboratory experiments were nducted to evaluate the changes in levels of cid soluble phosphorus in dairy manure during incubation. The incubated samples alyzed for dilute acid soluble phosphorus Troug 0.002N H2SO4 extraction procedure. regression analysis between the Troug orus values and the total phosphorus derived by summation of the raw material orus levels based on soil type showed that as a definite and characteristic rate of in- in Troug phosphorus with increasing of dairy manure slurry added. A barriered e water renovation system (BLWRS) was treating dairy cattle wastes. The BLWRS m x 9.1 m with a depth of 2.4 m. From June vember 31, 1974 the BLWRS reduced the l oxygen demand of the liquid dairy waste ercent or more, nitrogen by 85 percent or d ortho phosphorus by over 99 percent. 16

RY-BACTERIOLOGICAL STUDY OF FECTIVENESS OF DECONTAMINAT-

ING THE SEWAGE OF VOROSHILOVGRAD ON SEWAGE FARMS, (IN RUSSIAN),
Voroshilovgradskii Meditsinskii Institut (USSR).
M. F. Datsenko, and A. A. Loguda.
Gig Sanit 8, p 93-94, 1975.

Descriptors: *Water reuse, Waste water treatment, Biological treatment, Waste disposal, Sewage disposal, E. coli, *Bacteria, Industrial wastes, *Microorganisms, Soils, Irrigation, *Salmonella.
Identifiers: *Shigellas, Ukrainian-Ssr, *USSR(Voroshilovgrad).

Industrial and domestic sewage used for irrigation on sewage forms after biological treatment is characterized by small bacterial numbers, low coli-index and presence of pathogenic microorganisms (salmonellas and shigellas). Application of sewage to soil changes the relationship of indicator microorganisms. Microorganisms of the Escherichia coli group accumulated and the soil biocenose changed on plots irrigated with sewage for 2 yr.--Copyright 1976, Biological Abstracts, Inc.
W77-03128

CHARACTERIZATION AND DEWATERABILITY OF WATER TREATMENT PLANT RESIDUES,
Missouri Univ., Columbia. Dept. of Civil Engineering.
J. T. Novak.
Reprint: Journal of the Environmental Engineering Division, ASCE, Vol 101, No EE1, Proc Paper 11111, February 1975. p. 1-14. 13 fig, 1 tab, 17 ref. OWRT A-061-MO(2), 14-31-0001-3825 and 4025.

Descriptors: *Dewatering, *Waste water treatment, Treatment facilities, *Sludge treatment, Design, Waste identification.
Identifiers: Sand beds, *Sludge characteristics.

An attempt was made to relate internal sludge characteristics to the design of sand beds for sludge dewatering. From the data collected in this study, it appears that sand beds can be a useful sludge dewatering method depending upon specific characteristics of the sludge. The most critical sludge characteristic with regard to the use of sand beds is sufficient compressibility to prevent bed penetration. Other characteristics governing sludge draining and drying rates are the sludge specific resistance and extent of dewatering (solids concentration) obtainable by draining. Since these same characteristics also govern the process yields by other mechanical dewatering methods (10) it can safely be generalized that a sludge which dewaters poorly by mechanical means will be limited in its rate of application to sand beds. These data do, however, provide a means by which sand bed sizing, and therefore cost, can be compared on an equitable basis with other dewatering methods so that optimal selection of a sludge dewatering method can be obtained.
W77-03130

UTILIZATION OF MUNICIPAL WASTE WATER FOR FROTH FLOTATION OF COPPER AND MOLYBDENUM SULFIDES,
Arizona Bureau of Mines, Tucson.
W. W. Fisher.
Arizona Bureau of Mines, Mineral Technology Branch, Circular 17, 1976. 17 p, 13 fig, 11 tab, 7 ref. $0.75. OWRT A-046-ARIZ(2). 14-34-0001-6003.

Descriptors: *Sewage effluents, *Waste water treatment, *Activated sludge, *Froth flotation, *Ion exchange, *Foam fractionation, Industrial water, *Sulfides.
Identifiers: *Municipal waste water, *Copper ore processing.

Secondary treated sewage effluent was substituted for normal process water in laboratory tests simulating froth flotation of copper sulfide ores. Flotation recovery of copper and molybdenum sulfides showed significant detrimental response to sewage effluent. First, a voluminous, difficultly controlled froth was generated, even in the absence of a frothing agent, that has little mineral carrying ability. Second, sewage effluent caused a small loss in copper recovery and a large loss in molybdenum recovery. The detrimental affects of sewage effluent on flotation were partially overcome by tertiary treatment of the effluent by activated carbon adsorption and anion exchange. The forthing problem was significantly reduced after treating the sewage effluent by foam fractionation. Dilution of the effluent with normal process water resulted in a significant improvement in metal recovery. In addition, the large loss in molybdenum recovery was overcome by using a secondary collector in a combination reagent schedule. However, the secondary collector caused an appreciable loss in copper recovery.
W77-03132

RENOVATION OF MUNICIPAL WASTEWATER FOR GROUNDWATER RECHARGE BY THE LIVING FILTER METHOD,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
W. E. Sopper.
In: Biological Control of Water Pollution, p. 269-281, 1976. 11 tab. B-020-PA(17), B-047-PA(9), B-001-PA(13), B-069-PA(4), 14-01-0001-837.

Descriptors: *Sewage effluents, *Groundwater recharge, *Waste water treatment, Conservation, Soil filters, Irrigated lands, *Water reuse, Recycling.
Identifiers: *Renovation, *Municipal wastewater, *Cropland, *Forested areas, *Spray irrigation, *Land application.

Twelve years of research have indicated that the living filter system for renovation and conservation of municipal wastewater is feasible and that the combinations of agronomic and forested areas provide the greatest flexibility in operation. Such a system is more adaptable to small cities and suburbs than to large metropolitan areas because of the availability of open land close to the wastewater treatment plant, although the land area requirement is not a major prohibitive factor. At the recommended level of irrigation, 5 cm per week, only 52 hectares of land would be required to dispose of 4 million liters of wastewater per day. Although large contiguous blocks of agricultural and natural forest land would be the most desirable for efficiency and economy, major metropolitan areas could utilize golf courses, playing fields, forest preserves and parks, greenbelts, scenic parkways, and perhaps even divided highway and beltway medial strips. (See also W77-03148) (Sink-Penn State)
W77-03147

THE KINETICS OF ADSORPTION OF PHENOLS BY GRANULAR ACTIVATED CARBON,
Louisville Univ., Ky. Dept. of Environmental Engineering.
J. S. Zogorski, S. D. Faust, and J. H. Haas, Jr.
Journal of Colloid and Interface Science, Vol. 55, No. 2, May 1976, p 329 - 341. 9 fig, 5 tab, 9 ref. OWRT A-033-NJ(4), 14-01-0001-3830.

Descriptors: *Phenols, Water quality control, *Waste water treatment, *Activated carbon, Kinetics, *Adsorption.
Identifiers: Granular activated carbon, *Kinetics of adsorption.

The removal of phenols from aqueous solution via activated carbon adsorption is a feasible approach to diminishing the concentration of these contaminants in drinking waters. However, both the

kinetics of adsorption and the extent of adsorption at equilibrium are dependent on the physical and chemical characteristics of the adsorbate, adsorbent, and experimental system. Results of laboratory scale studies conducted to delineate the effect of such parameters on the kinetics of adsorption of phenols are reported. Parameters evaluated include: hydronium ion concentration, temperature, initial adsorbate concentration, size of adsorbent, competitive adsorption, and type of adsorbate. In addition, the nature of the rate limiting step in the adsorption process of phenols is described.
W77-03149

FIELD MONITORING TECHNIQUES AND DATA ANALYSIS,
North Carolina Univ. at Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 5A.
W77-03150

SUITABILITY OF LAGOON EFFLUENTS FOR IRRIGATION IN SOUTH DAKOTA,
South Dakota State Univ., Brookings. Dept. of Civil Engineering.
D. Odens.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 216, Price codes: A03 in paper copy, A01 in microfiche. Completion Report, September 1976. 42 p, 5 fig, 6 tab, 8 ref, append. OWRT A-052-SDAK(1). 14-34-0001-6043.

Descriptors: *Effluents, *Oxidation lagoons, *Irrigation water, Brackish water, Standards, Waste water disposal, *South Dakota, *Water quality standards, Waste water treatment, *Water reuse, Waste identification, Classification.

An evaluation and classification of lagoon effluents in South Dakota with respect to their suitability for irrigation and an estimate of the quality of water available was made. Lagoon waters from 20% of the total number of lagoons were sampled and analyzed during July and August. The water quality of the lagoon waters was compared to published water supply quality data for the respective water supply. From these comparisons, empirical relationships were developed permitting the prediction of lagoon water quality on the basis of published water quality data. Using these relationships, all lagoon waters were classified with respect to their suitability for irrigation. Estimates of volume of water available for irrigation was based on area of existing lagoons. Using tentative guidelines for waters suitable for irrigation developed by the Water Resources Institute, approximately 30% of the lagoons contain suitable water. Generally the sodium adsorption-ratio (SAR) was too high but in several instances where the SAR was acceptable the salinity as measured by conductance was unacceptable. The quantity of nitrogen was also evaluated. A mean value of 27 pounds of nitrogen per acre foot of water was found. (Wiersma-South Dakota)
W77-03152

A BUTANE FREEZING PROCESS FOR DEWATERING SLUDGE,
New York State Dept. of Environmental Conservation, Albany; and Virginia Polytechnic Inst. and State Univ., Blacksburg.
M. Z. Ali Khan, C. W. Randall, and N. T. Stephens.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 235, Price codes: A05 in paper copy, A01 in microfiche. Virginia Water Resources Research Center, Blacksburg, Bulletin 94, November 1976. 83 p, 36 fig, 8 tab, 41 ref. OWRT A-051-VA(1).

Descriptors: *Activated sludge, *Dewatering, Economic feasibility, Designcriteria, Filtration, Settling velocity, *Freezing, Waste water treatment, *Sludge treatment.
Identifiers: Gravity drainage, Specific resistance, Sludge conditioning, *Slurry freezing, Vacuum filtration, *Butane freezing process.

Utilizing butane as the refrigerant, the direct slurry freezing process was employed to condition waste activated sludge in order to improve subsequent dewatering. Using batch and continuous flow laboratory scale reactors, the process was evaluated from both a technical and economical standpoint. The sludge was placed in a closed reactor maintained at slightly less than atmospheric pressure, and liquid butane was bubbled through the sludge from a sparger at the bottom of the reactor. The boiling of the butane resulted in the formation of ice in the sludge but sufficient mixing was induced to prevent solid freezing. The sludge-ice slurry formed was removed, thawed and then dewatered using a variety of techniques. Recovery liquification and reuse of butane vapors, and the utilization of latent heat of fusion of the sludge-ice slurry to minimize requirements were evaluated to permit economic analysis. Reactor design requirements were determined. Waste sludges from five separate sources were obtained for experimental purposes. These sources included a municipal treatment plant, a highway reststop package plant, a small plant treating domestic waste from industrial employees, a plant treating pulp and paper waste, and laboratory scale aerobic digesters. Conditioning effectiveness was evaluated by gravity settling, vacuum filtration, and sandbed dewatering techniques. Both Buckner funnel and leaf test experiments, with and without chemical addition were used to evaluate filtration effectiveness. The results showed that the direct slurry freezing process using liquid normal butane as the refrigerant is an extremely effective method for conditioning waste activated sludge to promote settling concentration and dewatering. Furthermore, conditioning can be accomplished without the generation of a high strength supernatant. Important variables affecting slurry freeze conditioning are (1) the length of time the sludge is exposed to slurry freezing conditions; (2) the rate of freezing, which can be controlled by the butane flow rate; and (3) the total solids content of the mixed liquor being conditioned. Analysis and comparison of slurry freezing with other sludge conditioning techniques such as anaerobic digestion, heat treatment, chemical addition and indirect freezing indicate that slurry freeze conditioning produces superior results and can be operated more economically.
W77-03153

DYNAMIC RESPONSE OF FINAL SETTLING TANKS TO TRANSIENT LOADING CONDITIONS,
Delaware Univ., Newark. Dept. of Civil Engineering.
D. R. Pizarro.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 359, Price codes: A08 in paper copy, A01 in microfiche. Master of science thesis, June 1976. 141 p, 43 fig, 4 tab, 40 ref, 2 append. OWRT A-025-DEL(4).

Descriptors: Sedimentation, Sludge, Environmental engineering, *Waste water treatment, Suspended solids, Suspensions, Water pollution control, *Model studies, Activated sludge, *Simulation analysis, *Settling basins, Performance.
Identifiers: *Activated sludge process, *Clarification, *Final settling tanks, *Secondary settling tanks, Thickening.

The proposed dynamic model is based on the formation and propagation of concentration discontinuities constrained by the solids flux theory. The continuous thickener was divided into three regions: a uniform clarification zone, a uniform area intermediate region below the feed inlet and above the bottom zone, and a conically-shaped bottom zone for modeling purposes. Verification of the proposed model was accomplished by performing nonsteady state continuous thickening ex
ments using a calcium carbonate suspension. I
steady state operation was achieved by impo
step transients of the applied flux and the
derflow withdrawal rate on a continuous thick
previously maintained at steady state condit
A comparison of the model simulations an
laboratory data indicated that the concepts
ployed during the modeling provided a satisfa
description of dynamical conditions. (
Delaware)
W77-03156

**BEHAVIOR OF GROUND WATER SUB
TO IRRIGATION OF EFFLUENT - A
STUDY,**
Maryland Univ., College Park. Dept. of Civi
gineering.
J. T. Ostrowski.
Available from the National Technical Info
tion Service, Springfield, VA 22161 as PB-26
Price codes: A07 in paper copy, A01 in micro
M.S. Thesis, 1976. 121 p, 25 fig, 17 tab, 55
append. OWRT A-031-MD(1). 14-34-001-6021

Descriptors: *Water reuse, *Groundwater,
tion, *Sewage effluents, *Waste water treat
Model studies, *Water table, Maryland, Ap
tion rates, Simulation analysis, Evapotran
tion, Water pollution sources.
Identifiers: *Spray irrigation.

In the design of spray irrigation systems for
ment of sewage, an important variable
volume of water applied to the soil per sp
period of time. In geographical location
seasonally high water tables, the minimum
to the water table may be the controlling fac
determining the application rate. With a
derstanding of the process of moisture distri
in the soil and water consumption by plan
fluctuations of the groundwater table can be
tively modeled. Two dimensional infilt
evapotranspiration and moisture distributio
effluent spray irrigation field is investigate
the equation governing saturated-unsaturate
in porous media. A finite element formula
the flow problem is obtained by using the G
variational method. The area under investig
the oldest operating spray irrigation field
waste treatment system of the commun
Charles, Charles Co., Md. The spray ir
field under study has been in operation sin
resulting in a steadily increasing water tabl
tion that has had detrimental effects on th
ing vegetation. Fifteen weeks of operatio
simulated using the records of application a
mates of evapotranspiration. Results refl
characteristic seasonal fluctuations of the
water table. Water levels were observed
wells and recorded for use in verification
simulation model. The procedure may
presently practical due to the excessive a
of computation time necessary for effectiv
lation of the flow system. With subsequ
provements of the model, the efficiency o
lation will be increased, creating a too
could become quite useful in the planning p
spray irrigation treatment systems.
W77-03158

**A STUDY ON THE APPLICATIO
BIOGROWTH SHEETS TO IMPROVE L
EFFLUENT QUALITY,**
Missouri Univ., Rolla. Dept. of Civil Engin
B. G. Wixson.
Available from the National Technical I
tion Service, Springfield, VA 22161 as PB-
Price codes: A04 in paper copy, A01 in mic
M. S. Thesis, 1975. 62 p, 15 fig, 13 tab, 31 r
pend. OWRT A-077-MO(1). 14-
5025&6026.

Descriptors: *Algae, Reservoirs, Water
*Oxidation lagoons, *Algal control, Sewa
ment, *Waste water treatment, Chemical
demand, Organic matter.

entifiers: *Biogrowth partitions, *Algal growth.

astewater stabilization lagoons have been em-oyed in small communities where available land d favorable climatic conditions allow for utiliza-n as an economical secondary treatment ocess. Because of problems associated with the charge of algae in the effluent, the traditional goon may require either some process modifica-ns or additional effluent polishing processes in der to meet local water quality standards. The rpose of this study was to investigate the possi-ity of increasing attached algal growths on the rfaces of experimental biogrowth sheets to crease algal discharges and improve the removal iciency of organic materials as measured by emical Oxygen Demand (COD). The application biogrowth sheets was effective for the enhance-nt of lagoon stabilization capabilities with the lity to retain large microbial solids, or those h a size larger than the screen openings, from ng discharged. However, the practicability and sign characteristics of the lagoon modification h the application of biogrowth sheets should be aluated further with additional field investiga-ns.
77-03162

MING FARMLAND WITH CALCIUM UDGE,
ssouri Univ., Columbia. Dept. of Civil En-eering.
J. Winburn.
ailable from the National Technical Informa-n Service, Springfield, VA 22161 as PB-262 221, ce codes: A05 in paper copy, A01 in microfiche. ster of Science Thesis, July 1976. 74 p, 10 fig, tab, 34 ref, append. OWRT B-113-MO(1). SDI-OWRT-14-34-0001-6093.

scriptors: *Sludge treatment, Lime, Missouri, Vaste water treatment, Farm management, ter reuse, Treatment facilities.
ntifiers: *Calcium sludge.

ne sludge from the Columbia, Missouri, Water eatment Plant was tested in soil columns to termine its usefulness as a liming material for d soils. Plexiglass cylinders (8.9 cm x 45. 7 cm g) were used as the soil columns. The soil was acid (pHs 4.4) Mexico silt loam. Two methods sludge application were used: (1) sludge was roughly mixed with the soil prior to being ced into the column, and (2) sludge was applied ectly on the soil surface. Loading rates of 2.02, 1, 6.61, 8.82, 11.02, and 13. 23g sludge/kg soil y solids basis) were used. Distilled water was ched through each column at a rate equivalent three years normal precipitation. Results in-ated that mixing the sludge with the soil oduced more uniform and greater levels of nge in pHs, exchangeable Ca, K, and P2O5 n the surface applied sludge. With the sludge-l mixture, a loading 4-6g sludge/kg soil (9-13 tric ton/ha) raised the soil pHs to 6.0-6.5, a ge considered optimum for crop production. sociated with this increase in pHs were in-ases of 58% in exchangeable P2O5, 79% in K l 100% in Ca. The surface spreading of the dge without incorporation into the soil appeared e undersirable as this method of application re-upon the slow process of water transport to in-porate sludge into the soil, producing an even distribution of sludge and a minimal ount of chemial correction in the soil. (Novak-ssouri).
7-03163

E ROTATING BIOLOGICAL FILTER,
w South Wales Univ., Kensington (Australia). hool of Civil Engineering.
Barnes, and F. Wilson.
ste Disposal and Water Management in Aus-ia, Vol. 3, No. 4, July-August 1976, p. 3-4, 7-8. g, 12 ref.

Descriptors: *Sewage treatment, *Biological treatment, *Treatment facilities, Reviews, *Waste water treatment, Water quality standards, *Filters, Filtration.
Identifiers: *Rotating biological filters.

The increasing stringency of effluent discharge standards in many parts of the world has led to a trend away from individual cesspools and septic tanks towards the use of small sewage treatment plants for community use. The rotating biological filter, which relies on biological treatment by micro-organisms growing on a rotating disc partly immersed in the sewage, satisfies most of the requirements for an ideal plant of this kind. The principles of operation, design criteria, applications and performance of this type of installation are reviewed. (CSIRO)
W77-03282

LAND BASED SEWAGE SLUDGE MANAGEMENT ALTERNATIVES FOR LOS ANGELES: EVALUATION AND COMPARISON,
California Univ., Los Angeles. School of Architecture and Urban Planning.
A. Herson.
June 1976. 127 p, 1 fig, 41 tab, 55 ref, 4 append. (California Water Resources Center Project UCAL-WRC-W-503).

Descriptors: *Waste water treatment, *Sludge disposal, *Municipal wastes, Sludge treatment, Economics, Water law, Irrigation, *California, Sewage sludge, Federal Water Pollution Control Act, *Recycling, Water reuse, Evaluation, Alternative planning, Alternative water use, Management.
Identifiers: *Los Angeles(Calif), Federal Water Pollution Control Act Amendments(1972).

The city of Los Angeles' Hyperion treatment plant currently discharges digested sludge via a seven-mile outfall to Santa Monica Bay. The EPA and the California State Water Resources Control Board have issued directives that ocean discharge of Hyperion sludge be discontinued by the end of 1976 unless the sludge is further treated to meet the discharge limitations established by the SWRCB's Ocean Plan. Since treatment to meet these discharge limitations appears economically infeasible, the city has begun examining alternative means of disposing Hyperion sludge on the land. Many of the negative effects of the agricultural alternative are attributable to the use of secondary effluent for irrigation water. Effluent transportation and disposal account for 58% of the capital costs and 85% of the operating costs of this alternative, and the electricity needed for pumping effluent accounts for almost all (94%) the energy required. Considerable attention should be given to development of alternative irrigation water supplies if sludge is to be applied on an Antelope Valley site. The high total costs of the agricultural alternative, rather than presenting a financing problem for the city, present a cost-effectiveness problem for the state and Federal governments whose grants would cover the additional costs. Much of the high cost of the agricultural alternative is attributable to the agricultural recycling of 55.2 mgd of secondary effluent, a feature not shared by the remaining alternatives.
W77-03289

SYSTEM FOR DEWATERING DILUTE SLURRIES,
Environmental Protection Agency, Washington, D. C.
T. Lippert.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-245 720, Price codes: A02 in paper copy, A01 in microfiche. (Patent Application), Seriesl No. 520.218, November, 1974. 16 p, 7 fig.

Descriptors: *Sludge treatment, *Dewatering, Equipment, *Design criteria, *Activated sludge, *Waste water treatment, Performance.

An improved system for dewatering dilute slurries such as waste activated sewage sludge is described which allows for higher solids yields by decreasing the solids loading which in turn allows for a proportionally larger decrease in the sludge-belt contact time to effect dewatering. The device includes a spring-loaded or balanced sludge feed tray incorporating an adjustable flow splitter plug along with spring-loaded sludge side guides. A sludge cake compression section design which allows two-position adjustment of the compression roller is employed as a component in the backflushing of the sludge carrier screen using cake effluent. (Kreager-FIRL)
W77-03352

ANALYTICAL STUDIES FOR ASSESSING THE IMPACT OF SANITARY SEWAGE FACILITIES OF DELAWARE COUNTY, OHIO,
Enviro Control, Inc., Rockville, Md. Environmental Studies Group.
L. Peltier, M. Lewis, J. Cuneo, G. Shea, and D. Wagaman.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-250 672, Price codes: A17 in paper copy, A01 in microfiche. October 24, 1975. 375 p, 63 fig, 54 tab, 202 ref. Environmental Protection Agency Report No. EPA-905/9-76-003.

Descriptors: *Sewage treatment, *Sewers, *Treatment facilities, *Environmental effects, *Water quality, Land use, Interceptor sewers, Construction, Evaluation, *Ohio, *Waste water treatment.
Identifiers: Delaware County(Ohio).

An analysis of the environmental impact of a proposed sanitary sewage treatment facility and interceptor system for Delaware County, Ohio is presented. The environmental impacts of the sewage treatment facility at the chosen site are evaluated in terms of water quality, biology, land use, and aesthetics. The effects on water quality resulting from the proposed action are analyzed in terms of flow conditions, the waste loads introduced into the receiving stream, and existing and future ambient water quality conditions. Water quality problems of temporary duration which are associated with interceptor construction are also examined. (Kreager-FIRL)
W77-03353

RESEARCH NEEDS FOR THE POTABLE REUSE OF MUNICIPAL WASTEWATER,
Colorado Univ., Boulder. Dept. of Civil and Environmental Engineering.
K. D. Linstedt, and E. R. Bennett.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-249 138, Price codes: A10 in paper copy, A01 in microfiche. Report No. EPA-600/9-75-007, December, 1975. 202 p, 18 fig, 31 tab, 88 ref.

Descriptors: *Water reuse, *Reclamation, *Municipal wastes, *Waste water treatment, *Reclaimed water, *Potable water, Social aspects, Economics, Organic compounds, Inorganic compounds, Viruses, Research priorities, Toxicity.

Research needs associated with the potable reuse of municipal waste water are discussed. Topics covered include: Environmental Protection Agency research strategy for waste water reuse, current municipal waste water reuse practices, waste water treatment technology for potable reuse, treatment reliability and effluent quality control for potable reuse, socio-economic aspects of water reuse, research needs related to treatment for potable reuse, and the health effects of potable reuse associated with inorganic and organic chemical pollutants as well as with viruses. The identified research is designed to serve as a basis for future Environmental Protection Agency projects dealing with potable reuse of waste water. (Kreager-FIRL)
W77-03356

ASSESSMENT OF OFFSHORE DUMPING IN THE NEW YORK BIGHT, TECHNICAL BACKGROUND: PHYSICAL OCEANOGRAPHY, GEOLOGICAL OCEANOGRAPHY, AND CHEMICAL OCEANOGRAPHY.
National Oceanic and Atmospheric Administration, Miami, Fla. Atlantic Oceanographic and Meteorological Labs.
For primary bibliographic entry see Field 5B.
W77-03358

THE IMPACT OF FARGO, NORTH DAKOTA'S WASTE DISCHARGES ON THE INTERSTATE WATERS OF THE RED RIVER OF THE NORTH, SEPTEMBER 1969-APRIL 1970,
Federal Water Quality Administration, Kansas City, Mo.
For primary bibliographic entry see Field 5B.
W77-03361

WATER USAGE AND WASTEWATER CHARACTERIZATION AT A CROPS OF ENGINEERS RECREATION AREA,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Environmental Effects Lab.
For primary bibliographic entry see Field 5A.
W77-03362

CHLORINE DISINFECTION OF TREATED WASTEWATER IN A BAFFLED CONTACT CHAMBER AT LESS THAN 1 C,
National Environmental Research Center, College, Alaska. Arctic Environmental Research Lab.
R. C. Gordon, C. V. Davenport, and B. H. Reid.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-244 939, Price codes: A04 in paper copy, A01 in microfiche. Working Paper No. 21, October, 1973. 67 p, 11 fig, 7 tab, 35 ref.

Descriptors: *Disinfection, *Waste water treatment, *Chlorine, *Temperature, *Bacteria, Coliforms, Streptococcus, Effluents, Performance, Evaluation, *Chlorination.

The disinfection of treated waste water at temperatures in the 0-10 C range was studied. Batch treatment of one primary and three secondary effluents with chlorine revealed that effective disinfection was attained in all samples at a temperature of less than 1 C when the actual contact time was 60 min and the final chlorine residual was about 1 mg/liter (orthotolidine). Studies in an 8-compartment, 60-liter contact chamber with flow rates providing 30, 60, and 120 min theoretical contact time revealed that fecal coliforms were essentially destroyed (less than 5/100 milliliter) at temperatures of less than 1 C regardless of the flow rate or chlorine residual maintained. However, reduction of total coliforms to less than 1000/100 milliliter did not occur when the theoretical contact time was 30 min, even when the chlorine residual was 3.3 mg/liter (orthotolidine). For a theoretical contact time of 60 min, nearly 2 mg/liter chlorine residual were required before total coliforms were sufficiently reduced. Only slightly more than 0.5 mg/liter chlorine residual was required for sufficient reduction in total coliforms when the theoretical contact time was 120 min. Reductions in fecal streptococci were generally between those observed for total and fecal coliforms. Raising the temperature from 1 to 10 C did not significantly affect disinfection. (Freager-FIRL)
W77-03363

SHIP-TO-SHORE SEWAGE HOSE HANDLING TESTS,
Civil Engineering Lab. (Navy), Port Hueneme, Calif.
F. J. Campbell.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A017 692, Price codes: A05 in paper copy, A01 in microfiche. Technical Note N-1404, October, 1975. 98 p, 42 fig, 22 tab, 9 ref.

Descriptors: *Waste disposal, *Waste treatment, *Ships, *Transfer, *Design criteria, Evaluation, Performance, Equipment, Hoses.

Procedures and equipment for transferring waste from a ship's holding tank to pier waste-handling facilities were evaluated. The procedures tested included: loading, transporting, connecting, disconnecting, unloading, cleaning, and hose storing. The equipment tested included four types of transport vehicles, plastic and rubber hoses, metal and plastic hose caps and plugs, two powered reels, two types of storage and loading racks, a hose cleaning rack, a hose cleaning apron, and two types of hose supports. The systems selected as best suited to future sewage transfer operations included one for high- and low-load, high-turnover ports and a second for high- and low-load, low-turnover ports. Criteria for determining manpower and equipment requirements for the systems are outlined. (Kreager-FIRL)
W77-03364

ADVANCED TRICKLING FILTER FOR WASTEWATER TREATMENT,
Gary Aircraft Corp., San Antonio, Tex.
E. W. Leschber.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A018 318, Price codes: A03 in paper copy, A01 in microfiche. Air Force Report No. AFCEC-TR-75-6, August, 1975. 44 p, 13 fig, 4 tab, 3 ref.

Descriptors: *Trickling filters, *Tertiary treatment, *Waste water treatment, *Biological treatment, *Design criteria, Suspended solids, Biochemical oxygen demand, Equipment, Treatment facilities, Performance, Filtration.

A prototype advanced trickling filter unit for purifying secondary-treated waste water is described. The unit uses a foamed silica medium (GaryGlas) and has a design hydraulic load of 700,000 gallons/day. The design organic load (biochemical oxygen demand) and design solids load are 80 and 60 pounds/1000 cu ft/day, respectively. The unit is capable of reducing effluent biochemial oxtgen demand from 29 to 18 milligrams/liter, and reductions in total suspended solids from 64 to 32 milligrams/liter have been achieved. These reductions are sufficient for upgrading existing treatment plants to a level consistent with newer effluent limitations. Detailed design drawings of the trickling filter are provided. (Kreager-FIRL)
W77-03365

AMMONIA REMOVAL FROM WASTEWATER BY LIGAND EXCHANGE,
Gillette Co. Research Inst., Rockville, Md.
L. M. Smith, G. A. Lyerly, and M. E. Dooley.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-251 418. Price codes: A05 in paper copy, A01 in microfiche. Report EPA-600/2 - 76-103, April, 1976. 78 p, 21 fig, 13 tab, 27 ref.

Descriptors: *Waste water treatment, *Ion exchange, *Municipal wastes, *Ammonia, *Feasibility, Performance, Evaluation, Waste treatment, Chemical wastes, Alkalinity, Temperature.
Identifiers: *Ligand exchange.

A ligand exchanger consisting of copper ions on a hydrous zirconium oxide ion exchanger was tested in terms of its effectiveness in removing ammonia from secondary-treated municipal waste water and its regeneration capacity. Maximum ammonia uptake by the ligand exchanger occurred at a pH of 10-11 and corresponded to 0.1 millimole ammonia/millimole copper. Steam regeneration was temperature dependent, with maximum regeneration being complete after four column volumes of condensed steam at 135 C. Repeated loading ar regeneration through 25 cycles resulted in r physical particle breakdown nor copper leachin though some ammonia capacity was lost. Comm inorganics and organics exerted a minimal effe on the overall process. Runs with secondar treated waste water through five cycles were su cessful, with the exchanger capacity being ne that for pure ammonium chloride solution and e sentially no loss of capacity occurring. (Kreage FIRL)
W77-03367

TECHNICAL ASSISTANCE PROJEC GREELEY WASTEWATER TREATMEN FACILITY, GREELEY, COLORADO. JUN JULY, 1972,
Environmental Protection Agency, Denver, Co Technical Support Branch.
Available from the National Technical Inform tion Service, Springfield, VA 22161 as PB-245 7 Price codes: A02 in paper copy, A01 in microfich Publication No. S and A/TSB-4, August, 1972. p, 5 fig.

Descriptors: *Waste water treatment, *Treatme facilities, *Activated sludge, *Biochemical oxyg demand, *Optimization, *Trickling filters, M nicipal wastes, Industrial wastes, Biological tre ment, Performance, Efficiencies, Sludge, Orga compounds
Identifiers: Solids bulking, Cross connections.

Improvements in the performance of an activat sludge/trickling filter waste water treatment pl handling municipal and industrial wastes in Greeley, Colorado area are outlined. Modifi tions to the facility resulted in an increase in 5-d biochemical oxygen demand removal from 40% 70%. Most of the improvement was due to discovery of a partially opened valve which p vided a cross-connection between the mixed liqu from the activated sludge plant and the final fluent. An improved operational mode for the tivated sludge portion of the plant also resulted better effluent quality. Wasting to the primar was optimized by monitoring the sludge blanket the primary clarifiers, and wasting was continu until the primary clarifier blankets began to crease to the point that bulking of solids from primaries would occur. Thus, all of the solids t could be handled by the system as well as all of biochemical oxygen demand that could be utili in solids production were removed. Consistent fluent quality is expected to be difficult to achi at the plant due to the organic overload receiv and the plant's inability to handle sludge soli (Kreager-FIRL)
W77-03368

DECONTAMINATION OF WATER CO TAMINATED WITH POLYCYCLIC AROMAT HYDROCARBONS (PAH). I. ACTION CHLORINE AND OZONE ON PAH DISSOLV IN DOUBLY DISTILLED AND IN DE-IONIZ WATER,
G. S. Sforzolini, A. Savino, S. Monarca, and M. Lollini.
Available from the National Technical Inform tion Service, Springfield, VA 22161 as ORNL 2960. Price codes: A02 in paper copy, A01 microfiche. Oak Ridge National Laborat Translation No. ORNL-tr-2960, 19 p, 11 tab, ref. Translated from Igiene Moderna, Vol. 66, 3, p 309-335, 1974.

Descriptors: *Water treatment, *Oxidati *Ozone, *Chlorine, Organic compounds, Che cal reactions, *Waste water treatment.
Identifiers: *Polycyclic aromatic hydrocarbo Pyrene, Benzoanthracene, Benzopyre Benzofluoroanthene.

The destructive effects of ozone and chlorine various polycyclic aromatic hydrocarbons bidistilled or deionized water were investigat

one proved to be more effective in destroying
ch compounds as pyrene, 1,2-benzoanthracene,
-benzopyrene, 3,4-benzofluoroanthene, and
12-benzofluoroanthene. Ozone in the form of
onized air at a concentration of 0.40 mg/liter and
h a contact time of 30 min produced stronger
structive effects than aqueous chlorine solu-
ns with a concentration of 2 mg/liter did over
same contact time. Ozone was most effective
inst 3,4-benzopyrene, with reductions amount-
to as much as 100%. Spectrophotometric
dence for the formation of new chloro deriva-
es of pyrene and 3,4-benzopyrene was observed
er their reaction with chlorine. Thus, ozone ap-
ars to be preferable to chlorine for the oxidation
polycyclic aromatic hydrocarbons in water.
reager-FIRL)
77-03369

ECHANICAL MOLE BURROWS SEWER
NNEL,
r primary bibliographic entry see Field 8C.
77-03397

CTILE IRON PIPE SOLVES A TOUGH
WER PROBLEM AT JIMERSON CREEK,
r primary bibliographic entry see Field 8G.
77-03398

NOVATIONS IN SEWER DESIGN AND CON-
RUCTION,
chardson (Edward H.) Associates, Inc.,
wark, Del.
r primary bibliographic entry see Field 8G.
77-03399

ECAUTIONS TO BE TAKEN IN THE CON-
RUCTION AND MAINTENANCE OF WATER
PPLY AND SEWER SYSTEMS
ECAUTIONS A PRENDRE DANS LA CON-
RUCTION ET L'ENTRETIEN DES RESEAUX
AQUEDUC ET D' EGOUT),
r primary bibliographic entry see Field 8G.
77-03400

FILTRATION/INFLOW IMPROVEMENTS IN
E OYSTER BAY SEWER DISTRICT,
lzmacher, McLendon and Murrell, Melville, N.

H. Albanese.
ter Pollution Control Federation Highlights,
l. 13, No. 9, p D1, D6-8, September, 1976. 2 fig.

scriptors: *Infiltration, *Inflow, *New York,
ewers, Programs, Public utility districts, Har-
rs, Topography.
ntifiers: *Infiltration/inflow.

e program used by the Oyster Bay Sewer Dis-
t of Long Island, New York, to correct their in-
ration/inflow problem was discussed. The area
composed of a low-lying harbor and hillier areas
he east, south, and west. The basic system was
nstructed in 1929 of clay pipe with tar and mor-
joints. The original plant was replaced by a
kling filter plant in 1965. In 1966, an infiltra-
n/inflow study was conducted which revealed
t the area had a structurally sound system
ich did not have to be entirely replaced to
uce infiltration/inflow. It was determined that
y 20-30% of the system needed repair and a
nber of significant leaks were repaired. A major
t water lake which discharged salt water into the
tem was discovered. A modified Phase I study
s done in 1974 which indicated that 20-30% of
system contained 75-80% of the total infiltra-
n/inflow. Pilot cleaning indicated that all
draulic cleaning equipment should have a
nimum flow of 227 liters per minute (60 gpm);
t sewers being cleaned should be less than one
arter full; that sand traps should be used in all
nholes downstream of lines being cleaned; that
avy sand deposits are best removed by bucket
machines; and that 'bee liners' should not be used. A pilot grouting program revealed that air testing of each joint is required in spring areas to prevent the spring from entering the sewer at an adjacent joint; that sealing joints in these areas tends to cause a buildup of ground water which appears as a leak in an adjacent manhole; and that sealing visible leaks under static groundwater conditions eliminates infiltration. (Collins-FIRL)
W77-03401

ACTIVATED SLUDGE WASTE WATER TREATMENT PROCESS - USING SUCCESSION OF AEROBIC AND ANAEROBIC ZONES TO REMOVE NITROGENOUS MATERIAL.
Belgian Patent BE-840-694. Issued April 13, 1976.
Derwent Belgian Patents Abstracts, Vol. X, No. 36, p D3, October 13, 1976.

Descriptors: *Patents, *Waste water treatment, *Activated sludge, *Nitrification, *Nitrogen compounds, Aerobic conditions, Anaerobic conditions, Biological treatment, Nitrates, Nitrites, Chemical reactions, Dissolved oxygen, Nitrogen.

A patent for an activated sludge waste water treatment process that uses a succession of aerobic and anaerobic zones to remove nitrogenous material is described. The process involves the following steps: waste water is mixed with activated sludge and a gas containing free oxygen under aerobic conditions (above 1 milligram/liter of dissolved oxygen); the liquor is then treated under anaerobic conditions (below 0.3 milligrams/liter of dissolved oxygen) to convert nitrates and/or nitrites formed in the aeration stage to nitrogen; the liquor is again treated under aerobic conditions, with part of the treated liquor being returned to the anaerobic stage; the liquor passes to a settling tank from which part of the settled activated sludge is returned to the initial aeration stage; and the purified decanted liquor is then discharged. Unlike prior art processes, the above scheme provides efficient nitrogen removal without either requiring multi liquid/solid separations or having an adverse effect on the rate of separation at the decantation stage. (Kreager-FIRL)
W77-03402

SCREENING APPARATUS FOR REMOVAL OF SOLIDS - FROM SEWAGE WITH ROTATING SCREEN AND VERTICAL LIFT FOR RESIDUES.
Belgian Patent BE-841-043. Issued April 23, 1976.
Derwent Belgian Patents Abstracts, Vol. X, No. 37, p D3, October 20, 1976.

Descriptors: *Patents, *Screens, *Waste water treatment, *Solid wastes, *Sewage treatment, Equipment, Design criteria, Separation techniques.

A patent for a screening device that removes solids from sewage or other waste waters is described. The device includes a first cylindrical screen with a vertical axis that is provided with slits or openings through which the liquid flows, with the solids in the liquid becoming deposited thereon and thus separated from the general flow. This screen is also provided with a scraper and can be fixed or rotated by a motor. A second screen located at the side of the first screen which rises above the upper level of the liquid flow is also provided. A lifting plate is associated with this second screen and is moved up and down by a hydraulic ram. When ascending, the plate collects all of the solid matter that has accumulated on the second screen. The solid matter is then pushed by a pressure head and associated piston into a compression chamber. The walls of the latter decrease in diameter towards the outlet, and a spring-loaded articulated plate assists in compressing the solid reject. Screening is continuous and effective. (Kreager-FIRL)
W77-03403

BIOLOGICAL TREATMENT OF SEWAGE WATERS - DEVICE WITH INTERNAL AERATION ZONE,
M. I. Buzovkin, D. D. Zhukov, and D. V. Ivanyukov.
Soviet Patent SU-497-245. Issued March 15, 1976.
Derwent Soviet Inventions Illustrated, Vol. X, No. 38, p D3, October 27, 1976. 1 fig.

Descriptors: *Patents, *Sewage treatment, *Activated sludge, *Aeration, *Waste water treatment, Biological treatment, Equipment, Design criteria, Liquid wastes.

A patent for an activated sludge sewage treatment device that has an internal aeration zone is described. The device consists of a horizontal cylindrical vessel with a coaxial inner cylinder which divides the unit into an outer circular aeration zone and an internal settling zone. The aeration zone with horizontal filtration mesh packing is provided with an inlet for compressed air and an outlet for the disposal of sludge into the settling zone. A round tray for distributing the feed sewage is also provided along with a circular tray for distributing the recirculated activated sludge. The system also has a separating partition and a central collecting tray. (Kreager-FIRL)
W77-03404

SLUDGE COLLECTOR AND LIGHT LIQUID SEPARATOR-FROM SEWAGE WITH TWO TANKS IN SINGLE HOUSING AND COVER.
Belgian Patent BE-841-045. Issued August 16, 1976. Derwent Belgian Patents Abstracts, Vol. X, No. 37, October, 1976.

Descriptors: *Patents, *Waste water treatment, *Sewage treatment, *Sludge treatment, *Sludge disposal, Recycling, Liquid wastes, Separation techniques.
Identifiers: Sludge collectors, Sludge separators.

A patent has been issued for a sludge collector. A unit containing this collector and separator is designed to separate settled materials and light liquids from waste water and sewage. Water flows into the unit and materials which can settle into the collector. The remaining liquid moves under the partition into the separator where materials such as oil and fats rise to the surface to be removed. Then, the water passes under a partition and out of the unit. Separate pipes are used to pump out collected sludge and light liquids. The collector and separator are washed by water after evacuation. (Collins-FIRL)
W77-03405

SEWERAGE TREATMENT APPARATUS,
Waters (Edward) and Sons, Melbourne (Australia). (Assignee).
R. N. Edwards.
Australian Patent 475,357. Issued August 19, 1976.
Official Journal of Patents, Trade Marks, and Designs, Vol. 46, No. 30, p 3029, August, 1976.

Descriptors: *Patents, *Sewage treatment, *Waste water treatment, *Design criteria, *Equipment, Oxidation, Chemical reactions, Color, Taste, Odor, Phenols.

A patent has been issued for a liquid sewage and waste treatment apparatus which provides biological and chemical oxidation and sterilization, and color, taste, odor, phenol, cyanide, and phosphate reduction of the contaminants. It is characterized by a high degree of oxygen absorption and utilization. The treatment apparatus is composed of an enclosed pressurized chamber with an upper and lower section. Liquid sewage enters the lower section, and oxygen is supplied to the upper one. The liquid sewage is directed in a stream into the upper portion where it is broken into small particles which absorb the oxygen as they drop through the oxygen rich atmosphere. (Collins-FIRL)
W77-03406

BIOLOGICAL PURIFICATION OF SEWAGE WATER-IN A MULTI-STAGE TREATMENT TANK WITH ROTATING CONTACTOR SURFACES PARTLY IMMERSED IN THE LIQUID.
German Patent DS 2407-423. Issued September 2, 1976. Derwent German Patents Abstracts, Vol. X, No. 37, p D2, October, 1976.

Descriptors: *Patents, *Sewage treatment, *Biological treatment, *Equipment, *Design criteria, Tanks, Liquid wastes, Operation, Treatment facilities, Waste water treatment.

A patent has been issued for a process and apparatus for biological purification of sewage water which features a multi-stage treatment tank with rotating contactor surfaces partly immersed in the liquid. The treatment unit should have a treatment basin/contact element surface area ratio about 0.0049 cu m/sq m. It should never be less than this. Under normal operating conditions, obtaining the optimum effect requires little effort. (Collins-FIRL)
W77-03407

COAGULATION CLARIFYING EFFLUENTS CONTAMINATED WITH COLLOID SUSPENSIONS-BY ELECTROPHORESIS AFTER MIXING IN INSOLUBLE METALLIC PARTICLES.
German Patent DS 2461-943. Issued September 9, 1976. Derwent German Patents Abstracts, Vol. X, No. 38, p D2-D3, October, 1976.

Descriptors: *Patents, *Waste water treatment, *Coagulation, *Electrophoresis, *Design criteria, Colloids, Mixing, Metals, Solids removal.

A patent has been issued for a process for coagulation clarifying effluents contaminated with colloid suspensions by electrophoresis following mixture with insoluble metallic particles. The plant for treating dirty water containing collids by electrophoresis has a suspension, coagulation, and separation zone. An electrode pipe containing electrodes is adjacent to a treating vessel with a cone-shaped upper section and a lower suspension area which is cylindrical and has a conical lower portion. A suction pipe valve, a pipe and a suspension pump connect the interior of the treating vessel to the lower end of the electrode pipe which is connected, by a pipe at its upper end, to the upper end of the separating area. Waste water enters through the tip of the lower conical area of the suspension zone and exits through an outlet at the upper end of the separating zone. (Collins-FIRL)
W77-03408

BIOLOGICAL CONVERTER FOR FAECAL MATTER IN WATER - USING ROTARY TUBES WITH FIBROUS FILLING SUPPORTING THE BACTERIAL CULTURE.
Netherlands Patent NL 7601-914. Issued August 31, 1976. Derwent Netherlands Patents Abstracts, Vol. X, No. 38, p D3, October, 1976.

Descriptors: *Patents, *Biological treatment, *Sewage treatment, *Biodegradation, *Design criteria, Water purification, Tanks, Waste water treatment, Recycling, Water reuse.
Identifiers: Fecal matter.

A patent has been issued for a system for the conversion of fecal matter in water to harmless matter by a biological culture. The major component is a conversion tank which houses perforated tubes. The tubes are on wheels which rotate to allow submersion and complete emergence. The tubes contain a water insoluble material with a large surface area, exposable to both water and air, for bacterial growth. Water which has been purified may be either re-used or released directly into waterways. The water quality is such that it may be used in fish farming or cattle watering. With some chlorination, it may be used as potable water. (Collins-FIRL)
W77-03409

CENTRIFUGE FOR DEWATERING SEWAGE SLUDGE.
Australian Patent 475,847. Issued September 2, 1976. Official Journal of Patents, Trade Marks and Designs, Vol. 46, No. 32, p 3240-3241, September 1976.

Descriptors: *Separation techniques, *Centrifugation, *Sewage sludge, *Dewatering, *Patents, *Waste water treatment, *Sewage treatment, *Sludge treatment, Equipment.

A patent has been granted for a centrifuge which drains off sewage sludge. The equipment includes a drum which is tapered towards both ends, a hollow shaft that extends longitudinally within the drum for the passage of sewage sludge, and means to withdraw separated water at one end of the drum and dewatered sludge at the other end. A conveyor screw passes through the drum's interior, along the whole length of the drum. Additionally, a rotatable ejection wheel with blades adapted to accelerate the sludge tangentially to the direction of the wheel is arranged within the drum. Thus, with a wheel in the interior of the drum, at or adjacent to the largest cross-section of the drum, the centrifuge operates and communicates with the interior of the hollow shaft for dewatering and discharging separated sewage. (Kramer-FIRL)
W77-03410

INTEGRAL CIRCULAR WASTEWATER TREATMENT PLANT.
Australian Patent 473,063. Issued June 10, 1976. Official Journal of Patents, Trade Marks and Designs, Vol. 46, No. 20, p 1968-1969, June, 1976.

Descriptors: *Waste water treatment, *Patents, *Activated sludge, *Treatment facilities, *Aeration, Aerobic treatment, Aerobic conditions, Oxygen.

A waste water treatment apparatus was patented. It has concentric circular inner and outer walls. The radius of the inner wall is between one quarter and seven tenths the radius of the outer wall. A radial partition extends across the intermediate volume joined to the outer and inner walls, spaced from the first radial partition to form a portion of the intermediate volume bounded by segments of the outer and inner walls from 90 degrees to 330 degrees and a second portion consisting of the remainder of the intermediate volume. There is an aeration zone within the outer wall outside the first arcuate portion, enclosed by a cover. Oxygen gas is introduced in the aeration zone. Another passage introduced activated sludge and feed waste water to the aeration zone. A second aeration zone outside the first arcuate portion is also enclosed by a cover. Oxygen depleted gas discharged from the first aeration zone is introduced to the second aeration zone and mixed with the oxygen-containing gas. A gas vent discharges further oxygen depleted gas from the second aeration zone. The second oxygenated liquor is also discharged from the second aeration zone. Oxygenated liquor is uniformly distributed in the first arcuate portion around the inner wall segments for radial flow across the first arcuate portion. A trough around the upper part of the outer wall segment of the first arcuate portion discharges clarified water. Activated sludge is collected and removed from the lower part of the first portion and at least part of it is returned to the passage to the first aeration zone. (Snyder-FIRL)
W77-03411

DENVER'S HEADWORKS REFLECTS COMPLEXITY OF SYSTEM.
Hunt (Rodney) and Co., Orange, Mass.
R. W. Henderson.
Water and Wastes Engineering, Vol. 13, No. 10, p 63-64, October, 1976.

Descriptors: *Municipal wastes, *Waste water treatment, *Treatment facilities, Flow, Hydraulics, Pumps, Slide gates, Sluice gates, Aeration, Separation techniques, *Colorado.
Identifiers: *Denver(Colo).

Denver's waste water treatment program described, with particular emphasis on the complexity of the city's headworks. From Denver large northern primary treatment plant, influe arrives through two modulating 54 by 54 in sluic gates for secondary treatment; and intercept lines bring flows from outlying areas in the ea and west for both primary and secondary trea ment. Incoming flow is metered through a Parsh flume before entering the headworks. It is th aerated and routed through screens and bar cha nels and subsequently sent to grit basins for f treatment or diverted directly to primary clarifie Influent requiring primary treatment pass through 14 Rodney Hunt slide gates to the g basins, and from there flows are sent to the plant four primary clarifiers. The liquor flows out of t primary clarifiers to the primary effluent pum station where six pumps provide the boost nece sary for the remaining gravity flow processin From the pumphouse, flow continues to eight 2 foot deep aeration basins and then to seconda clarifiers after which it is discharged to an outf channel leading to the Platte River. The plant capable of handling average and peak flows of 1 and 200 million gallons/day, respectivel (Kreager-FIRL)
W77-03412

TOXICITY OF AMMONIA TO ALGAE I SEWAGE OXIDATION PONDS.
Hebrew Univ., Jerusalem (Israel). Human E vironmental Sciences Lab.
A. Abeliovich, and Y. Azov.
Applied and Environmental Microbiology. V 31, No. 6, p 801-806, June, 1976. 5 fig, 2 tab, 24 re

Descriptors: *Algal poisoning, *Oxidati lagoons, *Ammonia, *Algal toxins, *Sewage tre ment, Biological treatment, Kinetics, Oxidatio Alkalinity, Growth rates, Photosynthesis, S bilization, Nitrogen compounds.
Identifiers: Methylamine, Amines, Chlorella py noidosa, Anacystis nidulans, Plectone boryanum.

The effects of ammonia on the growth a photosynthesis of axenic cultures of algae in high-rate sewage oxidation (stabilization) po were investigated. Ammonia at concentratio above 2.0 millimoles and at pH values over 8.0 hibited the growth and photosynthesis Scenedesmus obliquus, a dominant species high-rate oxidation ponds. Photosynthesis Chlorella pyrenoidosa, Anacystis nidulans, a Plectonema boryanum was also susceptible to a monia inhibition. Methylamine exerted the sa effect as ammonia, and its penetration into al cells was pH dependent. When operated at a 1 hour detention time, the high-rate oxidation po maintained a steady state with respect to al growth and oxygen concentration, and the conc tration of ammonia did not exceed 1.0 millimol Shifting the pond to a 48-hour detention caused increase in pond water ammonia concentration 2.5 millimoles, and the pond gradually turn anaerobic. Photosynthesis, which usually elevat the pH of pond water to 9.0-10.0, could proceed beyond a pH of 7.9 because of the hi concentration of ammonia. The dominant fact in determining the oxygen regime and growth r in oxidation ponds run at short detention tim thus appear to be ammonia concentration and p (Kreager-FIRL)
W77-03413

THE INFLUENCE OF CARBON-NITROG RATIO ON THE CHLORINATION MICROBIAL AGGREGATES.
Rice Univ., Houston, Tex. Dept. of Environm tal Science and Engineering.
W. G. Characklis, and S. T. Dydek.

ter Research, Vol. 10, No. 6, p 515-522, 1976. ig, 12 tab, 27 ref.

scriptors: *Chlorination, *Oxidation, ıctericides, *Microbiology, *Slime, Waste er treatment, Chlorine, Carbon, Nitrogen, pended solids, Kinetics.
ntifiers: Polysaccharides, Substrates, Microbi- ilms.

periments were conducted with attached robial films in a continuous flow reactor to ermine the response of the films to ochlorite treatment as a function of influent strate concentration, influent carbon/nitrogen o, and shear force at the slime-water interface. periments were also conducted in batch tems with suspended organisms grown at vary- carbon/nitrogen ratios. Hypochlorite appeared react with attached microbial films grown at n carbon/nitrogen ratios, causing disruption partial detachment from the inert growth sur- e. Hypochlorite also inactivated a portion of active biomass. Experiments involving mercu- chloride addition indicated that the oxidizing racteristics of hypochlorite rather than its bac- cidal effectiveness are responsible for slime oval. Experiments with microbial suspensions ealed that extracellular microbial ysaccharides affect the rate of chlorine demand to a lesser extent the total chlorine demand in h suspensions. Hypochlorite addition signifi- tly reduced the suspended solids concentration . (Kreager-FIRL)
7-03414

MBINED PROCESS OF PYROLYSIS AND MBUSTION FOR SLUDGE DISPOSAL,
oto Univ. (Japan). Faculty of Engineering; and oto Univ. (Japan). Dept. of Sanitary Engineer-

Takeda, and M. Hiraoka.
vironmental Science and Technology, Vol. 10, 12, p 1147-1150, November, 1976. 5 fig, 2 tab, f.

scriptors: *Incineration, *Sewage sludge, udge disposal, Municipal wastes, *Waste water atment, Sludge treatment, Sulfur compounds, nperature, Treatment facilities.
ntifiers: *Combustion, *Pyrolysis, Hydrocar- s, Water scrubbing.

louble hearth incinerator was used to test the ect of pyrolysis and combustion on sewage dge. The incinerator was used with a secondary nbustion furnace. Sludge supplied through the of the incinerator, was thermally decomposed the pyrolysis gases were burnt in the seconda- combustion furnace. Some flue gas was passed venturi-type scrubber for particulate collec- efficiency study. The sludge, a cake of mixed nary and surplus activated sludge from a mu- pal sewage treatment plant, was combined heavy metal chlorides to study their behavior. temperatures as low as 450C, pyrolysis can uce feed sludge bulk density by 50%. Low tem- ature pyrolysis minimizes vaporization of vy metals in air, while high temperature pyrol- can produce an air pollution problem. drocarbons produced by pyrolysis can be ned in a secondary combustion furnace to vent pollution. Low temperature operation did effectively suppress sulfur oxides, but 40% of sulfur compounds oxidize to sulfur oxides ween 450 and 600C. Hydrogen chloride can ct with alkalis and nitrogen oxides can be con- ed by controlling product gases of pyrolysis. A perature of 600C minimized nitrogen oxide ssions. Dust collection was effected through er scrubbing. (Collins-FIRL)
7-03415

UDGE DEWATERING PILOT PLANT SIGN, PART I,
v Jersey Inst. of Tech., Trenton. Dept. of Civil Environmental Engineering.

P. N. Cheremisinoff, and M. A. Maglio, Jr.
Water and Sewage Works, Vol. 123, No. 11, p 90-95, November, 1976. 4 fig, 12 tab.

Descriptors: *Sludge treatment, *Industrial wastes, *Design criteria, *Pilot plants, Heat treatment, Dewatering, Treatment facilities, Chemical precipitation, Coagulation, Sludge disposal.
Identifiers: Chemical treatment.

Design considerations for a sludge dewatering plant were discussed in part one of a two-part article. First, the pilot plant was designed to handle secondary sludges as well as industrial sludges. Wide variations in sludge compositions at different plants and industries made this a necessity. Treatment stages included chemical treatment, heat treatment, and the dewatering process. The addition of chemicals such as lime to destroy pathogenic bacteria, and ferric chloride and ferrous sulfate to provide charge neutralization and coagulation was discussed. Heat treatment was considered as a means of improving sludge dewatering properties. Finally, a dewatering process was presented to deal with such factors as particle density, particle size, particle charge, degree of hydration, and compressibility. (Collins-FIRL)
W77-03416

DORR-OLIVER TO MARKET ECOLOTROL WASTE WATER TREATMENT PROCESS.
Chemical Engineering Progress, Vol. 72, No. 10, p 104, October, 1976.

Descriptors: *Waste water treatment, *Biological treatment, *Biochemical oxygen demand, *Activated sludge, *Nitrification, *Denitrification, Ammonia, Nitrogen, Microorganisms, Equipment.
Identifiers: Fluidized bed reactors.

A process which removes carbonaceous BOD (activated sludge), nitrifies ammonia nitrogen to nitrate form, and denitrifies nitrates to nitrogen was introduced. Fluidized bed reactors using microorganism-saturated media with high biomass concentration proved more economical than the more common concrete tanks or basins. The Hy-Flo system passes waste water up through a reactor partially filled with sand or a similar substance. After fluidization, the media becomes a vast surface on which microorganisms become attached. Biomass and biological reactions are like those of other biological treatment systems. In 15 min, 85-90% of carbonaceous BOD can be removed. Ninety percent nitrification is obtained in 18 minutes. Denitrification (99+%) can be achieved in 6 minutes. A pre-engineered equipment package will be developed for smaller plants. (Collins-FIRL)
W77-03417

HIGH GRADIENT MAGNETIC FILTRATION,
Sala Magnetics, Inc., Cambridge, Mass.
J. R. Harland, J. A. Oberteuffer, and D. J. Goldstein.
Chemical Engineering Progress, Vol. 72, No. 10, p 79-80, October, 1976. 1 fig, 2 tab, 7 ref.

Descriptors: *Waste water treatment, *Filtration, *Filters, Equipment, *Pilot plants, Sewage treatment, Economics, Costs, Operating costs, Waste treatment, Sewage treatment.
Identifiers: *Magnetic filtration.

Magnetic filtration may be used in waste treatment in two areas. First, it can directly filter suspended magnetic particles. The process may also remove non-magnetic materials by a seeding method. A simple high gradient magnetic separator is composed of a fibrous ferromagnetic packing or matrix filter bed which is externally magnetized. Economics of this method depend upon the form of the ferromagnetic matrix and the efficiency of the magnetic field. Contaminated material is passed through the filter and magnetic materials are trapped on the matrix fibers. In cases of non-magnetic suspended solids, a magnetic seed material, such as magnetite, is added to the water which is then flocculated to allow non-magnetic impurities to adhere to the seed material. Removal then occurs as with magnetic impurity removal. This technique has worked well in removing microbial cells and most viruses in treatment of raw sewage. Design features are given for a pilot plant and a total operating cost estimate of $0.10 to 0.15/1,000 gallons is given for a system which processes 27,000 gallons per minute of waste water. (Collins-FIRL)
W77-03418

SLUDGE INCINERATION.
For primary bibliographic entry see Field 5E.
W77-03419

WASTE-TREATMENT 'FARM' HARVESTS FIRMS.
Chemical Week, Vol. 119, No. 11, p 51-52, September, 1976.

Descriptors: *Tertiary treatment, *Irrigation, *Municipal wastes, *Industrial wastes, *Waste water treatment, Aeration, Percolation, Biochemical oxygen demand, Nitrogen, Phosphorus, Odor, Pulp and paper industry, Economics, Fertilizers, Crop production, Michigan, Symbiosis, *Water reuse.

A waste water treatment farm that uses partially treated waste water to irrigate and fertilize 4500 acres of corn is described. Waste water is collected from industrial sources and 13 municipal systems and is piped for distances up to 11 miles to the site. After biological treatment (aeration and settling) and percolation through the soil, the treated water has a biochemical oxygen demand value of 2.7 ppm and phosphorus and nitrogen levels of 0.02 ppm and 2 ppm, respectively. During the winter, incoming waste water is stored in a 850-acre lagoon with over 5-billion gallon capacity. The return from the sale of crops at the farm is offsetting the treatment costs which are surprisingly low for tertiary treatment. Users are charged 22 cents/1000 gallons, with an additional 2 cents/1000 gallons in acreage assessments by municipalities. The main problem encountered with this waste water treatment farm which is located in Muskegon, Michigan is the generation of odor from paper mill wastes. (Kreager-FIRL)
W77-03420

USE OF SLUDGE LEFT AFTER WASTE WATER DECANTATION AS A FERTILIZER OR SOIL CONDITIONER (LES BOUES DE DECANTATION D EAU RESIDUAIRES UTILISEES COMME FERTILISANT OU COMME CONDITIONNEUR DE SOLS),
S. De Haan.
Bulletin d'Information, Institut Belge pour l'Amelioration de la Betterave-Tiene (Belgium), Vol. 11, No. 7, p 60-62, 1976. 1 tab.

Descriptors: *Waste water treatment, *Sludge disposal, Metals, Lime, Recycling.
Identifiers: Netherlands, Land application.

The average inhabitant in the Netherlands produces 60 cubic meters of waste water per year, containing 40 kg of solid organic matter and 30 kg of mineral material. Secondary (microbial) sludge contains large numbers of microorganisms, which are very rich in nitrogen and phosphorus. This sludge is customarily dephosphated with ferric chloride or aluminum sulfate and stabilized by addition of thickeners. After maturation for one year, moist sludge develops very favorable physical properties. It is then dewatered and preconditioned, and sterilized to destroy pathogenic organisms and worm eggs before agricultural or horticultural use. The effect of nitrogen is predominant for sludge in the first year of application, and

is generally positive. Undesirable effects of heavy metals can be avoided by addition of lime. Percolation water from sludge is heavily contaminated. It is recommended that not more than 2 tons of municipal sludge/ha/yr, calculated as dry weight, be added to soil. (Text in French) (Henson-FIRL)
W77-03421

SPECIFIC ROLE OF LIME IN MUNICIPAL WASTE WATER TREATMENT-EXPECTATIONS AND REALITY (DIE SPEZIFISCHE ROLLE DES KALKS IN DER KOMMUNALEN ABWASSERREINIGUNG-ERWARTUNGEN UND REALITAETEN),
R. Kickuth.
Forum Umwelt Hygiene, Vol. 27, No. 2, p 300-305, September, 1976. 2 fig, 1 tab, 13 ref.

Descriptors: *Waste water treatment, *Lime, *Municipal wastes, *Phosphates, *Water purification, Recycling.
Identifiers: Federal Republic of Germany.

Addition of lime directly to municipal waste water has been proposed for two distinct purposes: waste water purification and phosphate recovery. However, reaction of phosphate with lime can also be carried out in a separate process following precipitation with Fe or Al, and therefore, there is no compelling reason for the use of lime in the actual clarification process. Hydrolytic decomposition of iron and aluminum phosphates by lime would have to be carried out within the sludge loop of the municipal water system. Addition of lime to municipal clarified sludges containing iron phosphate to produce equilibrium pH values of 11 would result in 90-95% conversion of the iron-bound phosphate to usable calcium phosphate. A maximum of 2 g calcium hydroxide would be required for each gram of iron in the sludge, for an average addition level of 500 g calcium hydroxide per cubic meter of sludge. The sludge volume in a municipal sewage treatment system amounts to about 1% of the waste water volume, for a daily municipal clarified sludge volume of about 150,000 cubic meters in the Federal Republic of Germany. Therefore, about 27,375 tons of calcium hydroxide per annum would be required for the conversion of iron phosphates. (Text in French) (Henson-FIRL)
W77-03422

ORIGIN OF NITROGEN POLLUTION IN SURFACE AND WASTE WATERS (ORIGINES DES POLLUTIONS AZOTEES DANS LES EAUX SUPERFICIELLES ET LES EAUX USEES),
J. Bebin.
Techniques et Sciences Municipales--L'eau, 71(8/9):347-362, August/September, 1976. 11 fig, 13 tab, 18 ref.

Descriptors: *Nitrogen, *Pollution abatement, *Waste water treatment, *Sewage treatment, *Nitrification, Surface waters, Biochemical oxygen demand, Oxygenation, Water pollution control.

New developments are reported in the elimination of the problem of nitrogen pollution in both surface waters and waste waters. The nitrogen concentration has increased in surface waters over the past few years. The major sources of the increase are domestic sewage and industrial waste waters. Nitrogen pollution must be abated in sewage treatment plants, in order to avoid further eutrophication of rivers. Nitrification may be achieved quite simply by oxygenation, followed by the use of an anoxic tank. Sewage can then be used as a source of carbon, allowing both denitrification and further reductions in biochemical oxygen demand. (Kramer-FIRL)
W77-03423

SLUDGE - WHERE WILL WE PUT IT,
CH2M/Hill, Corvallis, Oreg.
For primary bibliographic entry see Field 5E.
W77-03424

ACTIVATED CARBON FROM ACTIVATED SLUDGE,
Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Chemistry.
H. Bosch, G. J. Kleerebezem, and P. Mars.
Journal Water Pollution Control Federation, Vol. 48, No. 3, p 551-561, March, 1976. 5 fig, 2 tab, 21 ref.

Descriptors: *Activated carbon, *Activated sludge, *Adsorption, Oxidation, Filtration, Dewatering, Centrifugation, Pores, *Waste water treatment, *Biological treatment.

Investigations were conducted to determine if activated carbon with a sufficiently high surface area can be prepared from sludge; if this active carbon has necessary adsorption qualities; if the presence of carbon particles affects the rate and/or degree of biological oxidation; and if the active carbon acts as a filter aid in dewatering. Primary and secondary sludges were studied. The samples were centrifuged, dried, and the sludge carbonized in nitrogen gas. The samples were activated with steam. Pore structure, adsorption capacity, and the influence of active carbon on biological oxidation and floc structure in an activated sludge tank were investigated. This process facilitated regeneration of powdered carbon and the addition of commercial powdered carbon with a higher adsorption capacity may be beneficial. Adsorption is faster and more effective and an extra separator for carbon used in the tertiary purification is unneeded. Salts will be partly insoluble due to the regeneration procedure. (Collins-FIRL)
W77-03425

DESIGN AND CONTROL OF NITRIFYING ACTIVATED SLUDGE SYSTEMS,
Cornell Univ., Ithaca, N.Y. Dept. of Environmental Engineering.
A. W. Lawrence, and C. G. Brown.
Journal Water Pollution Control Federation, Vol. 48, No. 7, p 1779-1803, July, 1976. 13 fig, 8 tab, 20 ref, 1 append.

Descriptors: *Kinetics, *Nitrification, *Activated sludge, *Sludge treatment, Temperature, Oxygen demand, *Waste water treatment, Trickling filters.
Identifiers: Oxygen uptake.

A pilot study was conducted to determine criteria for the application of microbial growth kinetics and continuous-culture theory in the nitrification of activated sludge. A comparison of one- and two-sludge nitrifying systems was also made. This activity was done to aid the upgrading of a regional trickling filter plant in Cheektowaga, New York. Laboratory tests at 8 and 20C investigated temperature effects on nitrification; process stability against changing hydraulic, carbonaceous, and nitrogenous loads; and the use of biological SRT (sludge age) and controlled solids wasting. Steady-flow studies, reactor performance, settling characteristics, and microbial oxygen uptake, were considered. Experimental results indicated no essential differences in efficiency and performance of one- and two-sludge nitrifying systems operated under the same growth and temperature conditions; that nitrification can be controlled by applying biological solids retention time concepts and appropriate sludge-wasting policies; that nitrification is practically complete at temperatures of 8 and 20C with biological solids retention times of 20 and 10 days, respectively; and that maximum growth rates of nitrifying bacterial at 8 and 20C is approximately 0.25 and 0.5 days, respectively. Nitrification is definitely temperature dependent and use of either the one- or two-sludge systems should depend upon economic considerations. (Collins-FIRL)
W77-03426

CONCENTRIC WASTE-TREATMENT PLANT SAVES LAND, CUTS COST,
Stearns and Wheler, Cazenovia, N.Y.
S. G. Brisbin.
Civil Engineering-ASCE, Vol. 46, No. 2, p 74-76, February, 1976. 2 fig.

Descriptors: *Waste water treatment, *Biochemical oxygen demand, *Treatment facilities, *Waste treatment, *Land use, Landfills, Costs, New York, Weather, Aeration, Sludge disposal.
Identifiers: Imhoff treatment, Land application.

In 1969 the village of Camden, New York, located in the cold snow belt region immediately north of Oneida Lake, recognized that its waste water treatment facilities were inadequate and began planning the needed facility. The Village wanted a plant located near its existing Imhoff-type primary treatment plant that would be reliable, require a minimum of attention, be simple to operate, be compatible with the harsh winter conditions, be economical and easy to maintain. An extended aeration type process was selected, using three circular concentric tanks, the outer two for aeration and the central circle utilizing a covered final settling tank. It was designed to treat waste from an equivalent population of 4700, with an average flow of 800,000 gallons per day and a peak flow of two million gallons per day, and to provide 85% biochemical oxygen demand (BOD) and suspended solids reduction at average flow. The treatment process is relatively simple. Excess sludge is removed routinely from the system by pumping from the final clarifier to sludge holding and drying beds, then disposed of at a landfill or used as soil conditioner. Emergency generation equipment works automatically, when needed, to guarantee continued operation and treatment. Replacing portions of leaking sewers resulted in considerably reduced flows. Operating results indicate over 90% removals of all monitored pollutants. This plant cost only 60% of the cost of a conventional plant. (Snyder-FIRL)
W77-03427

THE ROTOR AERATOR: GROWING USE IN U.S. WASTE-TREATMENT PLANTS.
Civil Engineering-ASCE, Vol. 46, No. 2, p 76-77, February, 1976. 1 fig.

Descriptors: *Waste water treatment, *Sewage treatment, *Sewerage, *Treatment facilities, *Aeration, Aerobic treatment, Waste treatment, Aerobic conditions, Dissolved oxygen.
Identifiers: *Rotor aerators.

The rotor aerator was developed in the early 1950's as a low-cost method of sewage treatment. It has been used in sewage treatment plants ranging in size from 20,000 gpd to 40 mgd. In most cases, the rotor aerator is installed in an oxidation ditch with a race-track geometry. Using a ditch 10 to 16 ft deep was made possible by installing a baffle just downstream of the rotor aerator. When the aerated stream strikes the baffle, it plunges to the bottom of the ditch, then up again. Diffuser aerators have only about half the oxygen transfer efficiency of mechanical surface aerators. Turbine aerators have a more limited radius of influence than the rotor aerator. One-way movement around the oxidation ditch, with two rotor aerators 180 degrees apart, has an important advantage in nitrogen removal. The dissolved oxygen concentration tapers off downstream of the reactor. When it falls below 0.5 mg/liter, bacteria attack the nitrate ion, releasing both nitrogen and oxygen as a gas. (Snyder-FIRL)
W77-03428

ELEMENTAL DISTRIBUTION DIAGRAMS FOR BIOLOGICAL WASTEWATER TREATMENT,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Civil Engineering.
J. H. Sherrard, and L. D. Benefield
Journal Water Pollution Control Federation, Vol. 48, No. 3, p 562-569, March, 1976. 7 fig, 1 tab, ref.

escriptors: *Waste water treatment, *Biological eatment, *Activated sludge, *Analtical chniques, *Treatment facilities, Carbon, itrogen, Phosphorus, Kinetics, Microorganisms, istribution.

method is illustrated that may be used to ac-unt for waste water carbon, nitrogen, and nosphorus and to specify the form in which each ay be found after treatment. In the activated udge process, the organic components of the aste are partially oxidized by microorganisms, ter which the microbial mass is separated as udge by settling from the supernatant liquid. The pernatant may undergo further treatment, and e concentrated microbial mass is recycled to the ration chamber. Once a waste water has been efined on a biokinetic basis, effluent quality, udge production, nitrification, and other parame-rs may be predicted based on the concept of ean cell residence time. A laboratory study is quired to define the biokinetic constants for car-n removal and nitrification to plot the forms of rbon, nitrogen, and phosphorus as a function of ean cell residence time as they appear after treat-ent. Determining the distribution of phosphorus a function of mean cell residence time is rela-ely simple, because phosphorus is either incor-rated into the sludge produced in the carbon moval and nitrification steps or it will pass rectly into the effluent. It is suggested that veral uses be made of the graphical relationships volved, the most important being a realization of at a process can or cannot do under a specific erating condition. It is suggested that elemental rcentage distribution diagrams may be easily termined for a specific waste water for a variety process operating conditions that may exist at a eatment plant. (Snyder-FIRL)
77-03429

ACTORS AFFECTING POWDERED CARBON REATMENT OF A MUNICIPAL WASTE-ATER,
nvirotech Corp., Salt Lake City, Utah. Eimco-SP Div.
N. Wallace, and D. E. Burns.
urnal Water Pollution Control Federation, Vol. , No. 3, p 511-519, March, 1976. 7 fig, 3 tab, 3 f.

escriptors: *Waste water treatment, Analytical chniques, *Treatment facilities, *Carbon, Vaste water(Pollution), Municipal wastes, Pilot ants, Organic compounds.
entifiers: *Carbon treatment, Powdered carbon.

nominal 50-gpm pilot plant operated for about 15 onths using carbon treatment to remove soluble ganics from waste water. To quantify pertinent stem variables, periods of reasonably stable car-n system operation and performance were ntified by plotting effluent quality, carbon sage, and carbon system solids retention time r each day of pilot plant operation. The Freun-ch adsorption model is used to evaluate the ef-ct of treatment variables on carbon system sponse. Organic removal in the pilot plant car-n system is considerably higher than predicted adsorption by laboratory tests, reinforcing the esis that a removal mechanism in addition ex-ed in the carbon contactor. Treatment effects analyzed, including number of stages, chemi- pretreatment effects, biological effects, and eneration effects. In contrast to a previous dy, which indicated that adsorption and biologi- removal were operative in the first stage and edominantly adsorption removal in the second, sorption and biological removal apparently were erative in both stages. Because it is impossible model practically or predict theoretically carbon stem response, pilot plant studies for developing ing criteria for powdered carbon systems are ongly recommended. It seems that organic novals for two-stage counter-current treatment ng powdered carbon are higher than those for gle-stage treatment, but single-stage carbon treatment might be economically justified for relatively weak waste water. (Snyder-FIRL)
W77-03430

U. S. AIR FORCE GREENS COLORADO.
Water and Sewage Works, Vol 123, No 8, p 62-64, August, 1976. 7 fig.

Descriptors: *Waste water treatment, *Sewage treatment, *Sewerage, *Biochemical oxygen demand, *Treatment facilities, Colorado, Military reservations, Effluent, Recycling, *Water reuse.

Final polishing of effluent from the United States Air Force Academy's sewage treatment plant enables treated water to be recycled and used to irrigate the campus. Recycling water makes it possible to produce greenery unusual in this semi-arid region. Up to 20% of the wastes coming into the plant emanate from dining halls as garbage grindings, making the sewage twice as strong as what would normally appear in Coloado Springs. The plant uses primary sedimentation, industrial grit removal with full aeration, primary and secondary treatment filters, and intermediate clarifiers. Wastes are further purified in a four-stage reservoir system offering retention periods of 30 to 60 days and producing biochemical oxygen demand (BOD) that compares favorably with that of running streams. The water is used to irrigate lawns and shrubbery. Operation of the plant began in 1958. (Snyder-FIRL)
W77-03431

SHELTERS BOOST WINTER TREATMENT EFFICIENCIES,
Anderson-Nichols and Co., Inc., Boston, Mass.
L. W. Long.
Water and Sewage Works, Vol 123, No 8, p 32-33, August, 1976. 2 fig.

Descriptors: *Waste water treatment, *Sewage treatment, *Sewerage, *Treatment facilities, *Winter, Efficiencies, Materials, Maine.

Prefabricated, aluminum and fiberglass-plastic shelters around Mount Desert, Maine, sewage treatment facilities have resulted in a steadier demand in aeration requirements, energy savings, and less equipment wear in winter operation. All treatment plants on Mount Desert Island are of the secondary treatment type, utilizing extended aeration. The type of panels used in the shelters encourages heat from the sun to build up. At two plants, each made up of two aerator units, the seasonal load is sufficiently reduced in the winter that only one unit is needed, and only one was covered. Side wall panels are hinged so that they can be opened in summer for greater air circulation and maintenance. The steadier environment has resulted in less use of heaters. It is estimated that the energy savings alone could enable the shelters to pay for themselves. (Snyder-FIRL)
W77-03432

THE APPLICATION OF THE FOAM FRACTIONATION PROCESS TO THE REMOVAL OF VIRUSES. PART I. THE PRODUCTION OF A MATHEMATICAL MODEL TO PREDICT THE EFFICIENCY OF VIRUS REMOVAL,
Trent Polytechnic, Nottingham (England). Dept. of Life Sciences.
M. D. Guy, J. D. McIver, and M. J. Lewis.
Water Research, Vol 10, No 8, p 737-744, 1976. 2 fig, 3 tab, 4 ref.

Descriptors: Laboratory tests, *Waste water treatment, Analytical techniques, *Treatment facilities, *Foam fractionation, *Bacteriophage, Mathematical models, Efficiencies, Surfactants, *Viruses, Path of pollutants, Forecasting.
Identifiers: *Virus removal.

A laboratory scale foam fractionation plant was used to study factors affecting the removal of viruses. Viruses were represented by Escherichia coli Bacteriophage MS-2, and the surfactant was Arquad T50, a cationic agent composed of a blend alkyl quaternary ammonium chlorides. The level of Arquad T50 likely to be used in foam fractionation is toxic to Bacteriophage MS-2. If the water to be treated is mixed with the surfactant for a period before fractionation, the percentage of such bacteriophages that would be destroyed could be predicted mathematically. The removal of Enteroviruses with this cationic surfactant is not affected by toxicity. Virus removal depends on their adsorption to the surfactant and their physical removal as free virus particles entrapped in the interstitial liquid. (Snyder-FIRL)
W77-03433

EFFLUENT VARIABILITY ESTIMATION FOR COMPLETE-MIX ACTIVATED SLUDGE TREATMENT SYSTEMS,
Marquette Univ., Milwaukee, Wis. Dept. of Civil Engineering.
V. Novotny, A. J. Englande, Jr., and P. Majgani.
Water Research, Vol 10, No 8, p 699-709, 1976. 14 fig, 1 tab, 14 ref.

Descriptors: *Waste water treatment, *Biological treatment, *Activated sludge, Analytical techniques, *Treatment facilities, Effluents, Variability, Estimating, Mixing.

To meet effluent guidelines, it is necessary to quantitatively define activated sludge behavior with respect to transient loading conditions. A frequency transform technique was employed for developing mathematical models describing the waste water influent variability removal for completely-mixed biological treatment plants. The influent variability was simulated by a pulse function, a step function, a harmonic function, and a random signal. A principle of superposition can be applied for more complex influent variation patterns. The solution was presented for waste water treatment systems consisting of one mixed basin with decay or of two mixed basins, second with decay. A practical design equation was developed. Laboratory experiments were performed in an effort to verify the design equations. First, the steady state substrate removal coefficient was evaluated in a bench-scale study. Refinery waste water was used due to its relatively slow degradability. For random influent variation, input concentrations were changed at 2 hr intervals using a random number table. A pulse function was introduced by a 5 min application of a sample with 4200 mg/liter total organic carbon (TOC) followed by a return to the original 480 mg/liter TOC. A step function input was produced by a sudden 480 mg/liter increase in TOC concentration which was maintained. While some deviation from the theoretical model was indicated for random inputs, general agreement was within 5%. Both pulse and step function response showed excellent agreement with the theoretical equations, with observed error of 13 and 2%, respectively. (Snyder-FIRL)
W77-03434

BEHAVIOUR IN CONVENTIONAL SEWAGE PURIFICATION PROCESSES OF COLIFORM BACTERIA WITH TRANSFERABLE OR NON-TRANSFERABLE DRUG-RESISTANCE,
National Inst. for Water Research, Pretoria, South Africa.
W. O. K. Grabow, M. van Zyl, and O. W. Prozesky.
Water Research, Vol 10, No 8, p 717-723, 1976. 6 tab, 39 ref.

Descriptors: *Bacteria, *Waste water treatment, *Sewage treatment, *Biological treatment, *Sewerage, Analytical techniques, Treatment facilities, Filtration, Sedimentation, Sampling, E coli.
Identifiers: Drug-resistance.

The effect of biofiltration, sedimentation, chlorination, and sand filtration on coliform bacteria with transferable (R+) or nontransferable (R-) resistance to five common drugs was investigated. Grab samples were taken at a municipal sewage works after conventional primary sedimentation, biofiltration and secondary sedimentation, about 10 min after addition of chlorine to a total chlorine content of about 4 mg/liter, and after rapid sand filtration of the chlorinated effluent. The percentage of R- coliforms resistant to ampicillin (A), chloramphenicol (C), or streptomycin (S), but not kanamycin (K) or tetracycline (T) was slightly reduced. On the average the percentage of R+ coliforms resistant to one or more of these drugs was reduced by about 50%, mainly by biofiltration and sand filtration. The ratio of transferable to nontransferable resistance for drugs other than streptomycin increased during secondary sedimentation and chlorination. R factor transfer may occur in water. Rapid passage over stony surfaces in biological and sand filters is unfavorable for conjugation, while R factor transfer can be expected under the relatively stagnant conditions in sedimentation and chlorination tanks. The incidence of R factors conferring resistance to all five drugs simultaneously increased through treatment. The incidence of Escherichia coli I among R+ coliforms did not exceed 50%. The limited effect of conventional sewage purification on the incidence of drug resistance in bacteria supports the view that sewage should be treated by more advanced methods prior to discharge. (Snyder-FIRL)
W77-03435

CORRELATION BETWEEN BOD - TOC - TOD (ZUSAMMENHANG ZWISCHEN BSE5 - TOC - TOD),
K. Offhaus.
Vom Wasser, Vol. 46, p 35-63, 1976. 11 fig, 3 tab, 8 ref.

Descriptors: *Waste water treatment, *Pollutant identification, *Activated sludge, *Biochemical oxygen demand, *Chemical oxygen demand, Treatment facilities, Organic compounds, Carbon.
Identifiers: *Total organic carbon, Total oxygen demand.

Total organic carbon (TOC), biochemical oxygen demand (BOD), chemical oxygen demand (COD), and total oxygen demand (TOD) are important parameters for examining waste water. The difference in capacity for peptone degradation between a mixed culture and a Pseudomonas putida mono-culture is discussed in light of experiments performed. Using the effluent of a laboratory scale activated sludge plant, it can be demonstrated that Pseudomonas displays no stronger degradation capabilities than a mixed culture. The varying efficiency of the TOC and COD analysis, particularly with regard to carboxy-carbon, is mentioned. For oxidation of this type of carbon compounds, no external source of oxygen is provided which the carbon dioxide determines in TOC analysis. Extensive experiments indicate that in conventional COD determination nitrogen is not oxidized, in contrast with the TOD method with the Swing TOD analyzer where nitrogen is transformed into nitrous oxide. The correlations between COD, BOD, and TOC are discussed. The TOC value will, under certain conditions, allow BOD and COD to be rather precisely estimated. To reliably correlate BOD and TOC, numerous BOD determinations are required. (Snyder-FIRL)
W77-03436

SEWAGE PLANT FOR BRITISH VIRGIN ISLANDS.
Reinforced Plastics, Vol. 20, No. 5, p 138, May, 1976.

Descriptors: *Sewage treatment, *Treatment facilities, Plastics, Aeration, Scum, Bubbles, Construction, Activated sludge, Mixing, Equipment, *Waste water treatment.
Identifiers: *Virgin Islands(British), Glass fiber reinforced plastics.

A complete sewage treatment plant made of glass fiber reinforced plastics was designed for the Virgin Islands. The structure has the advantages of being corrosion resistant and light weight. It was designed to treat a 25,000 gpd dry weather flow of domestic sewage. The system consists of a GRP tank divided into an aeration chamber and an upward flow type settling chamber. A surface scum removal system avoids the problem of floating solids. Sewage enters the aeration chamber, is mixed with activated sludge, aerated, and transferred to the settling chamber. Solids from activated sludge settle to chamber base and return to the aeration chamber to be mixed with incoming sewage. Clarified effluent is discharged over a castellated weir. Air enters the aeration chamber through coarse bubble aerators. Construction is such that additional units can be added as needed. This system, for a population of under 500, is rectangular; a circular arrangement is recommended for populations of 800 or more. (Collins-FIRL)
W77-03437

LARGE FACTORY-BUILT PUMP STATION BEGINS OPERATION.
For primary bibliographic entry see Field 8C.
W77-03438

'GIVE FLOTATION A TRY' WAS CHALLENGED.
For primary bibliographic entry see Field 5F.
W77-03439

SMALL VILLAGE GETS ADVANCED TREATMENT.
The American City and County, Vol. 91, No. 8, p 69, August, 1976.

Descriptors: *Tertiary treatment, *Treatment facilities, *Sewage treatment, Flow rates, *Filtration, Oxidation, Aerobic digestion, Biochemical oxygen demand, Suspended solids, Flocculation, *Waste water treatment, Pennsylvania, Aeration.
Identifiers: *Extended aeration, Phosphorus removal, Sand filters.

The new sewage treatment plant installed at the small village of McAlisterville, Pennsylvania, is an extended aeration plant. Due to the low flow rate of the receiving stream from April to October, 95% BOD removal is required. During the rest of the year, 90% BOD removal is achieved, meeting Pennsylvania's Department of Environmental Resources requirements. Design features include twin circular oxidation ditches with a common wall into which pumped wastes are discharged. The 'doughnut' is an oxidation ditch and the 'hole' is a clarifier, separated by a common wall. Rapid sand filters are used to further reduce BOD and suspended solids to the required levels. The sand filters have a top layer of coarse anthracite coal, a middle layer of common sand, and high-density garnet sand at the bottom. A chlorine contact tank provides chlorination and also serves as a reservoir for filter backwash water. Sludge is treated by aerobic digestion and land disposal. A chemical feed system is ready if phosphorus removal becomes necessary. Flocculation and tube settling mechanisms supplied with the sand filters can aid phosphorus removal. (Collins-FIRL)
W77-03440

BIOCHEMICAL MECHANISMS IN THE METHANE FERMENTATION OF GLUTAMIC AND OLEIC ACIDS,
Buck, Seifert and Jost, Englewood Cliffs, N. J.
C-N. Weng, and J. S. Jeris.
Water Research, Vol. 10, No. 1, p 9-18, 1976. 5 fig, 4 tab, 9 ref, 1 append.

Descriptors: *Anaerobic digestion, *Waste wate treatment, *Laboratory tests, *Methane, Radioac tivity, Chemical analysis, Chemical reactions, Fer mentation.
Identifiers: *Glutamic acid, *Oleic acid.

A series of 2-1 laboratory scale digesters fed on batch basis similar to typical field operations wer used to determine the biochemistry involved i anaerobic digestion processes used in waste wate treatment. L(+)-glutamic acid and oleic acid wer the substrates fed. Identifications were made b chemical analyses of the liquid feed and effluen and radioactivity analyses of the gases produce was by liquid scintillation techniques. It was con cluded that glutamic acid was probably degrade to methane and carbon dioxide throug mesaconic, pyruvic, lactic, propionic, and aceti acids. Beta-oxidation seemed to be the majo mechanism in oleic acid fermentation. The majo volatile acid intermediate found in methane fer mentation of L(+)-glutamic and oleic acids wa acetic acid. (Collins-FIRL)
W77-03441

LARGE SCALE SEWAGE TREATMENT PLAN WITH SLUDGE INCINERATOR.
Chemical Age of India, Vol. 27, No. 7, p 651-65 July, 1976.

Descriptors: *Waste water treatment, *Sewag treatment, *Biological treatment, *Sewerag *Treatment facilities, Sludge, Sludge disposal, I cineration.

The treatment process of a large industrial sewag treatment plant was described. The plant, locate at the Grenzach Work of Ciba-Geigy AG, Base Switzerland, treats wastes from the production dyestuffs, textile auxiliaries, and industrial chem cals as well as municipal sewage from nearly con munities. Major plant sections are a chemica physical section, clarifying section, biological se tion, sludge and waste incinerator section. Chem cal works effluent is pretreated in the chemica physical section. The effluent has a high salt co tent, acidic pH, residual solvents, non-ferro metals, and other organic substances which inhib biological decomposition. This section contai the acidic flocculation and flotation stage, the a kaline flocculation and sedimentation stage and buffer basin. Municipal sewage is pretreated in th mechanical clarifier parallel to the industrial e fluent treatment line. A mixture of both is fed to distributor basin. Biological treatment consists aeration, deaeration and secondary settling. Th return sludge is recirculated and the cleane sewage is fed into the Rhine river. The sludge dewatered and burned in a fluidized-bed furnac and the ash (6 cu m per day) containing no mo than 1% organic matter is hauled to a dump. Th plant also contains a refuse incinerator whic burns all kinds of industrial wastes. (Collins-FIRL
W77-03442

COMPARISON OF AIR AND OXYGEN AC TIVATED SLUDGE SYSTEMS,
Camp Dresser and McKee, Inc., Boston, Mass.
A. A. Kalinske.
Journal Water Pollution Control Federation, Vo 48, No. 11, p 2472-2485, November, 1976. 2 fig, tab, 57 ref.

Descriptors: *Waste water treatment, *Biologic treatment, *Activated sludge, *Biochemical o ygen demand, *Air, *Oxygen, Dissolved oxyge Metabolism.

A study to determine the reality of claims made f oxygen activated sludge systems was conducte It was claimed that elevated DO caused bas changes in the metabolic activity and chara teristics of organisms composing an activate sludge floc; that flocculant suspension settles at higher velocity for any given concentration such flocculant biomass; that an elevated D

uces microbial cell growth or synthesis will be
uced for the removal of a given amount of or-
ic substrate or BOD; and that an elevated DO
mits a higher bio-oxidation rate and higher
D loadings for equal BOD removals. Results in-
ated that for most physical and biochemical
ameters, both systems were comparable. An
ated DO above 2 mg/liter had no influence. A
er mixed liquor pH may cause some inhibition
itrification at lower temperatures in oxygen
ems. Oxygen systems can supply a high ox-
n input needed for high strength wastes for
ch air systems need increased mixing intensity.
her DO levels possible with oxygen systems
vide a short period reservoir of oxygen when
ake increases, but if this uptake lasts, DO
els will drop to zero if supply does not match
and. But this is true for all systems. With
itoring and automation, both systems can per-
n equally in this respect. In large plants, costs
relatively equal. There is no basis for the as-
ption that oxygen systems demand less power.
llins-FIRL)
7-03443

YGEN AND AIR ACTIVATED SLUDGE: OTHER VIEW,
wn and Caldwell, Walnut Creek, Calif.
S. Parker, and M. S. Merrill.
rnal Water Pollution Control Federation, Vol. No. 11, p 2511-2528, November, 1976. 13 fig, 2 46 ref.

scriptors: *Waste water treatment, *Activated lge, *Oxygen, *Air, *Dissolved oxygen, Mix- Flocculation, Aquatic microorganisms.
ntifiers: Food to microorganism ratio.

study was conducted to compare and clarify flicting claims made for the oxygen and air ac-ted sludge processes. The activity of DO was lied by consideration of the effects of cromixing and micromixing on activated sludge size, substrate concentration, F:M ratio, and penetration. It was found that oxygen ac-ted sludge required higher DO levels to main- floc penetration of DO than air activated dge. Oxygen systems can be designed at higher l levels than air systems. However, oxygen tems had a better ability to cope with unex-ted increases in organic loading. The systems e proved equal in operation when a minimum of 2.0 mg/liter was maintained in regard to set-bility. The previously mentioned minimum DO ured an equal sludge production for most mu-pal waste waters. DO control in air activated tems is no more costly or difficult on an annual is than in an oxygen activated system. The ox-n activated system has produced high per-nance standards which only well-designed and rated air systems can compete with. The ox-n system is best applied in situations where ce limitations occur, where there is a side load tuation, or when strong municipal or industrial te waters are treated. (Collins-FIRL)
7-03444

TRAVIOLET DISINFECTION: AN ALTER-TIVE TO CHLORINATION,
nada Centre for Inland Waters, Burlington tario).
G. Oliver, and J. H. Carey.
rnal Water Pollution Control Federation, Vol. No. 11, p 2619-2624, November, 1976. 2 fig, 6 16 ref.

scriptors: *Waste water treatment, *Activated lge, *Treatment facilities, *Ultraviolet radia-, *Disinfection, Chlorination, Waste er(Pollution), Toxicity.
ntifiers: *Ultraviolet disinfection.

ause chlorine residues are toxic to aquatic life, disinfection of waste water was studied. This one with a UV wavelength of about 254 nm. It not become popular because chlorine was cheaper and provided some degree of residual protection. Major problems encountered with UV disinfection were: the need to maintain residual protection from bacterial contamination during transport and the difficulty of obtaining totally sterile water from a raw water supply with variable turbidity and color. Studies have shown that 99% of total coliform, fecal coliform and fecal streptococcus could be killed with low doses, that bacterial kill was independent of light intensity, and that ultrasonic pretreatment produces a higher bacterial kill. Experiments were conducted with UV lights over secondary clarifiers in an activated sludge plant. This indicated that total coliform and fecal streptococcus are less sensitive to UV light than fecal coliform bacteria. All pathogens and viruses studied were as sensitive or more sensitive to UV light than fecal coliforms. Problems encountered were large surface areas of clarifiers which altered effluent residence time near the surface and the variable flow rate at waste water treatment plants. Flat weirs on final clarifiers are necessary before UV disinfection is practical. This method would also suppress algae growth on the weirs. Its major advantage is that it is less harmful to the environment than chlorination, though chlorine is cheaper. (Collins-FIRL)
W77-03445

FLOW EQUALIZATION BY USE OF AERATION TANK VOLUME,
Drexel Univ., Philadelphia, Pa. Dept. of Environmental Engineering.
R. E. Speece, and M. LaGrega.
Journal Water Pollution Control Federation, Vol 48, No 11, p 2599-2608, November, 1976. 8 fig, 8 ref.

Descriptors: *Waste water treatment, *Biological treatment, *Biochemical oxygen demand, *Treatment facilities, Flow, *Flow control, Flow rates, Aeration.
Identifiers: Flow equalization.

Flow equalization was examined as a method for producing waste treatment effluent with a better average quality. It was expected that this process would improve overall treatment efficiencies, extend plant design life, reduce operating costs, and reduce waste water quantities by-passed. Economic advantages of the system were not clear. However, a study showed that a separate upstream equalization basin is more costly than basing design overflow rates for the clarifiers on the peak rather than average flow. There was a definite relationship between overflow and suspended solids in the effluent. A reduction in effluent was accompanied with a reduced BOD. Several methods were tried in flow equalization, such as basins to equalize raw flow before reaching treatment plant; some waste water flows were equalized to provide uniform 24-hr discharge to anaerobic contact processes; and some industries store a 24-hr waste water flow, check it for toxicity and then discharge it to a biological treatment unit. Aeration tank volume has been used for equalization purposes and oxygen transfer has also been a consideration in the process. Other considerations discussed were the probability of overflow, concentration equalization, soluble BOD removal, location of equalization systems in the flow scheme, and regulatory approval. (Collins-FIRL)
W77-03446

VIRUS AND BACTERIAL REMOVAL FROM WASTE WATER BY LAND TREATMENT,
Agricultural Research Service, Pheonix, Ariz. Water Conservation Lab.
R. G. Gilbert, C. P. Gerba, R. C. Rice, H. Bouwer, and C. Wallis.
Applied and Environmental Microbiology, Vol 32, No 3, p 333-338, September, 1976. 1 fig, 5 tab, 19 ref.

Descriptors: *Waste water treatment, *Sewage treatment, *Pollutant identification, *Viruses, *Sewage bacteria, Coliforms, Streptococcus, Salmonella.
Identifiers: *Virus removal, *Bacterial removal.

This study was conducted to evaluate the effective removal of viruses and bacteria from secondary sewage effluent and to evaluate their movement in soil during flooding. Results indicated that fecal coliforms, fecal streptococci, and total bacteria were decreased about 99.9% in renovated well water and Salmonella were not found in 5 liter well water samples from the east center well at two samplings. There were no detectable viruses in the well water which indicated that 99.99% of them were removed during percolation of waste water through 9 m of sandy loam soil. Sewage effluent samples contained poliovirus types 2 and 3, echovirus 7 and 15, coxsackiervirus B4, and reovirus types 1 and 2, which varied with the time of year. It was proved that human bacterial and viral pathogens were mostly removed from sewage effluent when it percolates through the soil. After eight years of operation, the project showed that viruses, enteric bacterial pathogens, and pollution indicator organisms in renovated sewage effluent were very decreased or nondetectable after filtering waste water through soil recharge basins. Land treatment was shown to be a very satisfactory method of waste water renovation. Studies on the detection and assessment of the survival potential of virus populations retained in the soil should be undertaken. (Collins-FIRL)
W77-03447

AN OPERATOR'S APPROACH TO AEROBIC DIGESTER SUPERNATANT DISPOSAL PROBLEMS,
Montgomery County Sewer Authority, Oaks, Pa.
R. G. Fricker.
Water Pollution Control Federation Highlights, Vol 13, No 10, p D2-D3, October, 1976.

Descriptors: *Waste water treatment, *Pollutant identification, *Biochemical oxygen demand, *Treatment facilities, *Digestion, *Aerobic treatment, Waste disposal, Anaerobic digestion.
Identifiers: *Aerobic digestion.

Problems associated with aerobic and anaerobic digester supernatant and means of detecting them were discussed. Two major problems encountered with aerobic supernatant are the tremendous hydraulic loading caused by abruptly returning large amounts of supernatant to the head of the plant and the possibility of high SS levels returned to the head of the plant with the supernatant. The first problem can be determined by noticing SS concentrations at the influent and effluent end of the primary and secondary clarifiers and by noticing solids washing over the weirs during supernatant return. Scheduling the liquid return for low flow times and slowing the rate reduces the hydraulic load on the treatment units. Some form of settling aid can reduce the second problem. With anaerobic digester supernatant excessive BOD can be formed which can be monitored by keeping good BOD records for influent and effluent of each treatment unit and by DO tests to determine the freshness of the incoming load. A black septic sludge on top of primary tanks can indicate a problem. A hydraulic overload may be countered by methods similar to those used with the problem in aerobic digester processes. Turbidity and SS tests can determine high solids loading. Hydrogen sulfide content can be determined by tests or by a rotten egg odor in the plant. Problems with pH can be handled by monitoring the pH of the supernatant. The amount of suspended solids in the supernatant can be controlled by polyelectrolytes. (Collins-FIRL)
W77-03449

SUPERNATANT DECANTING OF AEROBICALLY DIGESTED WASTE ACTIVATED SLUDGE,
Carmel Sanitary District, Calif.
M. Paredes.
Water Pollution Federation Highlights, Vol 13, No 10, p D4-D5, October, 1976. 2 fig.

Descriptors: *Waste water treatment, *Activated sludge, *Treatment facilities, *Aerobic treatment, *Digestion, Sewage treatment, Aeration, Mixing.

The Carmel Sanitary District, in 1973, began operation of a secondary activated sludge treatment process. It included two aeration tanks which were aerated and mixed by two surface aerators which ran continuously. Supernatant decanting basins in each tank helped to settle sludge and return solid materials to the digestion area. Submerged entrance ports allowed mixed sludge to enter the basins and settle on the bottom while clarified or decanted supernatant passed over outlet weirs to return to the waste water flow ahead of the secondary sedimentation tank or to the final clarifier. The sludge was returned to the main digestion area. Because of turbulence in the supernatant decanting basins a clear decanted liquid was impossible. The tanks were alternately shut down creating the problems of sludge rising to the top and going over the weirs and bad odors after start-up. A hole was cut in one side of the decanting basins which extended above and below the water line and a wooden sluice box was attached to the outside of the settling basins over the hole to allow it to slide up and down until clear liquid could be brought into the settling basin and the surface sludge kept out. This caused poor settling in the digestion area and one tank was permanently shut down to receive sludge from the other and act as a settling tank. This cleared the decanted supernatant and improved sludge settling in the main digestion area. A submersible pump was installed 60 cm below water level in the decanting basin of the settling tank to pump clear supernatant to the aeration basins and aid in the clarification of the final clarifier. Drawing off sludge regularly from the bottom of the settling tank, not running an aerator in this settling, and keeping water sprays on top of the tank produces a consistently clear supernatant. (Collins-FIRL)
W77-03450

INTERMITTENT SAND FILTRATION OF HOUSEHOLD WASTERWATER,
Wisconsin Univ. -Masison. Dept. of Civil and Environmental Engineering.
D. K. Sauer, W. C. Boyle, and R. J. Otis.
Journal of the Environmental Engineering Division, Proceedings of ASCE, Vol. 102, No. EE4, p 789-803, August, 1976. 3 fig, 10 tab, 9 ref, 1 append.

Descriptors: *Waste water treatment, *Activated, Sludge, *Pollutant identification, *Biochemical oxygen demand, *Chemical oxygen demand, Treatment facilities, Filtration, Sands.

Intermittent sand filtration of septic tank and aerobic treatment unit effluents was investigated as an alternative to subsurface disposal for household waste water treatment. Filters at one homesite treated septic tank effluent, while those at another homesite treated activated sludge extended aeration effluent. Twenty-four hour composite samples were obtained from the septic tank, aerobic unit, and intermittent sand filter effluents. Combined aerobic and sand filter treatment provided a highly treated effluent in terms of BOD, COD, and TSS. The effluent quality meets suggested current surface discharge effluent stands. It operated successfully at an average hydraulic loading rate of 3.5 gal/day sq ft for 9 mo. before surface sand maintenance was required. Sand filtration of septic tank effluent at an average hydraulic loading rate of 5 gal/day/sq ft produced complete nitrification and BOD and TSS that meet surface discharge effluent standards. Successful maintenance for sand filters used with a septic tank included removing the top 2 to 5 in. of clogged sand and replacing it with clean sand and raking it without adding clean sand. Total annual costs for treating and disposing of household waste water using intermittent sand filter systems ranged from $400 to $700, depending on the use of septic tanks or aerobic treatment units and the size and method of maintenance of the sand filters. (Snyder-FIRL)
W77-03452

TERTIARY TREATMENT OF SEWAGE EFFLUENTS,
Mander, Raikes and Marshall, Bristol (England).
M. A. Kershaw.
Process Biochemistry, p 21-23, 25, September 1976. 10 ref.

Descriptors: *Waste water treatment, *Sewage treatment, *Biological treatment, *Treatment facilities, *Tertiary treatment, Sewage effluents, Biochemical oxygen demand, Suspended solids.

A review is presented of tertiary treatments, or polishing processes, applied to sewage effluents to make them comply with standards more stringent than 30 ss (suspended solids): 20 BOD. In upward flow filters, the larger solids are trapped in the bottom, coarse medium and the finer solids in the top, fine medium. Their performance depends on the flow rate; with filter effluent loading of 100 cu m/sq m/day 90% solids removal can be achieved. With Micro strainers, results vary with the quality of fabric on the drum, and the key to successful performance is the quality of the influent. Rapid gravity sand filters are successful as treatments for percolating filter and activated sludge effluents. Normal loading is between 200 and 250 cu m/sq m/day. Slow sand filters are found at older, smaller sewage works; they produce higher costs than other methods of effluent polishing. With the upward flow carrier, the effluent is passed up through a bed of pea gravel and the suspended solids are removed from the influent by flocculation and settlement. The action of lagoons or maturation ponds consists of a combination of buffering sedimentation and biological activity. For a retention period of 4 days 40% ss and BOD reduction and 70% E. coli reduction are often achieved. In the operation of grass plots, the first consideration is to ensure that the feed liquor is evenly distributed and does not pond or short circuit. This form of treatment is well suited to small sewage works in rural areas where land is available. (Miller-FIRL)
W77-03453

MINIMIZING THE WASTE DISCHARGES FROM WATER TREATMENT PLANTS,
Connecticut Univ., Storrs. Dept. of Civil Engineering.
T. B. Helfgott, and W. J. Lacy.
American Institute of Chemical Engineers Symposium Series, Vol. 71, No. 151, p 166-169, 1975. 2 fig, 2 tab, 6 ref.

Descriptors: *Sludge treatment, *Dewatering, *Energy equation, *Solid wastes, *Waste water treatment, Electric power, Mathematical models, Waste treatment, Analytical techniques.
Identifiers: Power indices.

A solids power index for making normalized comparisons between various dewatering techniques is proposed. The power index expresses the energy utilization of a dewatering technique in kilowatt-hours/1000 lb dry solids. The parameter is limited in that it does not account for the specific chemical nature of the solids being dewatered nor dewatering characteristics as a parameter for filterability. Graphical comparisons involving the solids power index as a function of % solids are illustrated for dewatering via evaporation, vacuum filtration, double cell gravity concentrations, and screw press multi-roll sludge dewatering. (Kreager-FIRL)
W77-03455

GROUNDWATER QUALITY ADJACENT TO A SEPTIC TANK SYSTEM,
ADI, Ltd., Fredericton (New Brunswick).
T. Viraraghavan, and R. G. Warnock.
American Water Works Association Journal, Vol. 68, No. 11, p 611-614, November, 1976. 8 fig, 2 tab, 9 ref.

Descriptors: *Groundwater, *Water quality, *Septic tanks, Water analysis, Tanks, Nitrogen, Pollutant identification, Soil water, Waste water treatment, Snow, Public health, Lysimeters, Soil analysis.

An investigation was performed to determine the adequacy of a septic tile system as a treatment to reduce constituents of septic tank effluent. Adjacent groundwater was analyzed to determine its chemical and bacteriological quality. The study site was near Ottawa, Canada. Low winter temperatures with snow cover and snow melting in the spring with high groundwater levels were the most significant climatic conditions affecting the study. A collecting tank was installed into which some of the septic tank effluent from the household system was diverted. In addition, an observation trench was constructed to install the lysimeters and collect soil water samples collected through the lysimeters. Groundwater from the observation trench was sampled and analyzed. Test site soil was evaluated as to its percolation rate and coefficient of permeability. Environmental factors considered were temperature, unsaturated depth of soil (depth of groundwater), and snow cover. Results showed that soil removed a high percentage of TSS, BOD, SOC, ammonia nitrogen, iron, coliforms, fecal coliforms and fecal streptococci from septic tank effluent. High ammonia reduction corresponded with increases in nitrate levels in adjoining groundwater, a possible health hazard. Groundwater levels affect soil limits for pollutant absorption. Pollutant concentrations in groundwater as well as nitrate nitrogen were higher near the tile and significantly decreased farther away from the tile end. Winter operation was not especially problematic, as the snow cover and hot water discharge from the system kept nearby ground warm. (Collins-FIRL)
W77-03456

CYANOPHAGE ANALYSIS AS A BIOLOGICAL POLLUTION INDICATOR-BACTERIAL AND VIRAL,
North Carolina Univ. at Greensboro. Dept. of Biology.
For primary bibliographic entry see Field 5A.
W77-03460

A STUDY OF MIXING CHARACTERISTICS OF SEWAGE STABILIZATION PONDS WITH RADIOACTIVE TRACERS,
Birmingham Univ., (England), Dept. of Civil Engineering.
K. O. Iwugo, and R. Winnicki.
The Public Health Engineer, Vol. 4, No. 5, p 138-142, September, 1976. 5 fig, 4 tab, 15 ref.

Descriptors: Analytical techniques, *Domestic wastes, *Sewage treatment, *Stabilization, *Tracers, Ponds, Mathematical studies, Fluid mechanics, Retention, Radioactivity, Measurement, Evaluation, Performance, *Mixing.

The actual retention times of domestic waste waters in two sewage stabilization ponds were determined using the fundamental fluid mechanics concept of residence time distribution and radioactive tracers. The dispersion index of mixing in each of the ponds was also deduced to quantify the degree of mixing in each of the ponds. Both tritium and chromium-ethylenediaminetetraacetic acid complex were found suitable for the determination of the residence time distribution. Tritium is more economical but has a half-life of 12-15 yr as compared with a half-life of 28 days for the chromium-ethylenediaminetetraacetic acid complex, making

latter tracer more attractive from an environ-
ntal standpoint. (Kreager-FIRL)
7-03461

E OF INTRINSICALLY SAFE INSTRUMEN-
TION.
primary bibliographic entry see Field 5A.
7-03462

BORATORY STUDIES ON THE EFFECTS
TEMPERATURE ON ACCUMULATION OF
LIDS IN BIOLOGICAL FILTERS,
on Univ., Birmingham (England). Dept. of
logical Sciences.
R. N. Shephard, and H. A. Hawkes.
ter Pollution Control, Vol. 75, No. 1, p 58-72,
6. 12 fig, 1 tab, 18 ref.

scriptors: *Sewage treatment, *Laboratory
s, *Temperature, *Filters, Biochemical oxygen
nand, Microorganisms, Oxidation, Organic
npounds, *Waste water treatment, Filtration.
ntifiers: *Biological filters.

oratory scale filters under controlled tempera-
e conditions with and without macrograzers
re used to investigate seasonal variations in the
accumulation in biological filters. The BOD of
d and effluent, the wet weight of the film, and
CO2 output for each filter were determined
ekly. Results indicated that without
crograzers, solids accumulation was controlla-
at higher temperatures by microbiological ac-
ty. Contributing factors for this seemed to be
rnating periods of build-up and sloughing
sed by an increase in the microorganisms
ich are the attachment layer on the substratum
grazing by microfauna, and the differential ef-
t of temperature on the rates of BOD removal
oxidation of the removal BOD. There was a
uction in the oxidation rate as measured by
2 output at temperatures less than 20C, though
ilar temperature reductions did not have a great
ect on the BOD removal rate. The increased ac-
nulated solids in the filter were partially respon-
le for reduced BOD removal efficiency at low
peratures. At 20C, the amount of solids was
trolled at a more uniform and lower level by
zing than by microbiological means. It seems
t some applied organic matter is immediately
dized by microorganisms while some may be
red and oxidized later. (Collins-FIRL)
7-03464

TRAVIOLET PURIFICATION SYSTEM.
primary bibliographic entry see Field 5A.
7-03467

TRATE MONITORING.
primary bibliographic entry see Field 5A.
7-03468

TOMATION: A SHORT HISTORY, BUT A
NG FUTURE,
eeley and Hansen, Philadelphia, Pa.
M. Norkis, and H. D. Gilman.
ter and Wastes Engineering, Vol. 13, No. 7, p
98, 100, July, 1976. 1 fig.

scriptors: *Automation, *Waste water treat-
nt, *Automatic control, *Computer models,
esign, Monitoring, Mathematical models, In-
mentation, Treatment facilities.
ntifiers: Computer hardware, Computer soft-
re.

tomation is rapidly entering the field of waste
ter treatment as the costs of computer hardware
lines and more relevant computer systems are
igned. The needs of waste water management
lude development of reliable sensors, per-
mance specifications for new and existing hard-
re, research and development of control strate-
gies, development of designers' guides, and study of interactions of unit processes. More computerized monitoring and control units are being installed and contribute to both centralized and distributed control systems. The U. S. Environmental Protection Agency has supported automation efforts, including the role of universities, development of digital technology to reduce costs, and mathematical modeling for waste water treatment. Instrumentation and automation in the Philadelphia area is described. Specific hardware and software is also detailed. (Collins-FIRL)
W77-03469

THE LIMITATION OF THE RATIO OF FECAL COLIFORMS TO TOTAL COLIPHAGE AS A WATER POLLUTION INDEX,
Department of Agriculture, Lethbridge (Alberta).
For primary bibliographic entry see Field 5A.
W77-03472

EFFECT OF VARIABLE LOADING ON OXYGEN UPTAKE,
Iowa State Univ., Ames, Dept. of Civil Engineering.
J. B. Duggan, and J. L. Cleasby.
Journal Water Pollution Control Federation, Vol. 48, No. 3, p 540-550, March, 1976. 6 fig, 2 tab, 14 ref.

Descriptors: *Activated sludge, *Pilot plants, *Settling basins, *Dissolved oxygen, *Oxygen demand, Mixing, Aeration, *Waste water treatment, Pollutant identification.
Identifiers: *Oxygen uptake, *Package plants, Waste loading.

A study was conducted to determine oxygen uptake responses to influent waste loading in an activated sludge system. The study employed a package pilot plant consisting of an aeration basin and a hopper-bottom final settling basin. There were six 24 hr test runs made during the late summer and early fall. Results indicated a direct response of mixed liquor DO to influent substrate load variations when DO levels are greater than the DO concentration critical to microbial oxygen utilization. DO deficit changes were a dependable measure of oxygen transfer rate changes in the mixed liquor and an indirect measure of variations of mixed liquor oxygen demand. Measurement of mixed liquor oxygen uptake rates also proved a good indicator of microbial oxygen uptake response to influent substrate load variations. There was evidence that mixed liquor DO levels below those critical to microbial oxygen utilization contributed to lower substrate removal efficiencies in the system. It was suggested that the magnitude of endogenous respiration and the temporary substrate storage as results of aeration detention time caused a dampening of mixed liquor oxygen uptake response relative to corresponding variations in the influent substrate loading. Maintenance of mixed liquor DO above critical levels is necessary to achieve high substrate removal efficiencies. (Collins-FIRL)
W77-03473

RAPID DETECTION OF BACTERIAL ENDOTOXINS IN DRINKING WATER AND RENOVATED WASTE WATER,
Texas Univ. Health Science Center at San Antonio. Dept. of Pathology.
For primary bibliographic entry see Field 5A.
W77-03474

INVESTIGATION OF OXYGEN TRANSFER TO SLIME AS A SURFACE REACTION,
Toledo Univ., Ohio. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5B.
W77-03476

TRANSFERABLE DRUG RESISTANCE ASSOCIATED WITH COLIFORMS ISOLATED FROM HOSPITAL AND DOMESTIC SEWAGE,
Florida Univ., Gainesville. Dept. of Environmental Engineering Sciences.
For primary bibliographic entry see Field 5A.
W77-03478

INFILTRATION/INFLOW - THE KANSAS CONNECTION,
Black and Veatch, Kansas City, Mo.
For primary bibliographic entry see Field 5G.
W77-03479

A STUDY OF SUBSTRATE REMOVAL IN A MICROBIAL FILM REACTOR,
Cape Town Univ. (South Africa). Dept. of Chemical Engineering.
N. P. Harris, and G. S. Hansford.
Water Research, Vol. 10, No. 11, p 935-943, 1976. 12 fig, 1 tab, 43 ref.

Descriptors: *Mathematical models, *Chemical oxygen demand, *Microorganisms, *Slime, Model studies, *Organic loading, Carbon, Oxygen, Kinetics, *Waste water treatment.
Identifiers: *Biofilm reactors, Hydraulic loading.

A mathematical model was proposed to predict the quantity of substrate removable by slime when it is subjected to various hydraulic and organic loadings. It was, also, to determine if performance of the slime was limited by either a lack of organic carbon or oxygen, or both. Supportive data was obtained by measuring substrate removals on a vertical experimental biofilm reactor over a range of hydraulic and organic loadings similar to an industrial type operation. The model is based on basic chemical engineering principles of interfacial mass transfer, diffusion, and biochemical reaction and, using kinetic parameters which fell within variations reported in literature, predicted the reactor's COD removal capacity when subjected to organic and hydraulic loadings. It also showed whether the operation of the film was limited by substrate, oxygen, or both together. It indicated that change from one to the other occurred between organic loadings of 300 to 500 mg/liter COD. There was poor correlation between model predictions and experimental results pertaining to hydraulic loadings approaching minimum wetting rate. The model becomes unreliable in predicting results of conditions of low hydraulic load. (Collins-FIRL)
W77-03480

INNOVATION IS AN OLD IDEA--WITH A BIG FUTURE,
Camp, Dresser and McKee, Boston, Mass.
R. H. Culver, A. A. Kalinske, and R. L. Woodward.
Water and Wastes Engineering, Vol. 13, No. 7, p 43-48, 112, July, 1976. 1 tab.

Descriptors: *Waste water treatment, *Sewage treatment, *Sewage disposal, *Water treatment, Reviews, Computers, Recycling, Design, Potable water, Energy, *Water reuse.

An historical perspective of developments in treating water and sewage was used to project the types of future developments in the field. Advances in this area have traditionally been evolutionary rather than radically advanced by leaps and bounds. Most techniques presently used were developed during the past fifty years and the processes and materials involved refined with the passage of time. Systems are being designed and developed which will have a probable lifetime of fifty to seventy-five years. There is no expectation of radical advances and the water treatment and sewage disposal systems of the next one hundred years will be quite recognizable. Considerations such as cost effective systems and energy efficiency, as well as resource recovery and recycling of

clarified water for uses other than drinking water. Computerization will also become a more important part of systems design in the future. (Collins-FIRL)
W77-03482

GRANT AID FOR PLANT OPERATIONS: AN EVALUATION,
New York State Dept. of Environmental Conservation, Albany. Environmental Quality Research and Development Unit.
For primary bibliographic entry see Field 5G.
W77-03483

AEROSOL PRODUCTION BY IRRIGATION EQUIPMENT USED FOR LAND APPLICATION OF WASTE WATER,
Brookhaven National Lab., Upton, N. Y.
For primary bibliographic entry see Field 5A.
W77-03484

RISK OF COMMUNICABLE DISEASE INFECTION ASSOCIATED WITH WASTE WATER IRRIGATION IN AGRICULTURAL SETTLEMENTS,
Hadassah Medical School, Jerusalem (Israel). Environmental Health Lab.
For primary bibliographic entry see Field 5C.
W77-03485

REMOVAL OF BOD AND NITROGENOUS POLLUTANTS FROM WASTEWATERS,
Air Products and Chemicals, Allentown, Pa. (Assignee).
J. P. Casey, and M. L. Spector.
United States Patent 3,994,802. Issued November 30, 1976. Official Gazette of the United States Patent Office, Vol. 952, No. 5, p 2160, November, 1976. 1 fig.

Descriptors: *Patents, *Waste water treatment, *Aerobic conditions, *Anaerobic conditions, *Nitrogen, *Biochemical oxygen demand, *Mixing, *Activated sludge, Nitrification, Denitrification, Dissolved oxygen.

A process for purifying waste water with activated sludge has been patented. Waste water is subjected to continuous flow through several successive zones of an activated sludge system, where BOD is reduced and nitrogenous pollutants are removed. The influent waste water is mixed with activated sludge, nitrified and denitrified, and mixed with free oxygen-containing gas under aerobic conditions. This provides a mixed liquor which is passed, without separation, to further treatment under anaerobic conditions in the presence of nitrates or nitrites plus microorganisms. The liquor is then again treated with an oxygen-containing gas and is introduced into a final settling zone to separate the settled solids from the supernatant liquid. Part of the settled solids are returned as activated sludge; a portion of the microorganisms which have been oxidized are returned; and the mixed liquor is maintained with a dissolved oxygen level of one ppm and a F/M ratio of 1.5. (Kramer-FIRL)
W77-03486

SEWAGE SLUDGE TREATMENT SYSTEM,
California Inst. of Tech., Pasadena, Calif. (Assignee).
J. J. Kalvinskas, S. Pasadena, and W. A. Mueller.
United States Patent 3,994,804. Issued November 30, 1976. Official Gazette of the United States Patent Office, Vol. 952, No. 5, p 2160-2161, November, 1976. 1 fig.

Descriptors: *Incineration, *Sewage treatment, *Liquid wastes, *Activated carbon, *Recycling, Mixing, Sludge treatment, Sludge disposal, Settling basins, Sedimentation, Effluents, *Sewage sludge, *Patents.
Identifiers: *Pyrolysis.

A patented method for treating raw liquid sewage is described. The process, used when the waste includes water with dissolved organic and inorganic matter as well as suspended matter, involves mixing the raw liquid waste with activated carbon and ash, then introducing the mixture into a primary settling tank for settling the suspended matter as primary sludge. The effluent from this first tank is mixed, then fed to a secondary settling tank to permit the settlement of secondary sludge. Both the primary and secondary sludges are dewatered and sent to pyrolysis equipment. There, they are formed into activated carbon and ash, mixed with raw liquid waste and effluent. In this particular invention, the primary and secondary sludges are pyrolyzed separately to form separate quantities of activated carbon and ash. The products of pyrolysis of the primary sludge are mixed with the raw waste while the products of the pyrolysis of the secondary sludge are mixed with the effluent from the first settling tank. (Kramer-FIRL)
W77-03487

COMPARATIVE ASSESSMENT OF THE EFFECTIVENESS OF CERTAIN METHODS MAKING INDUSTRIAL EFFLUENTS NONCARCINOGENIC, (IN RUSSIAN),
Gorkovskii Meditsinskii Institut (USSR).
P. E. Shkodich, M. P. Gracheva, Y. P. Tikhomirov, and V. V. Baikovskii.
Gig Sanit 1, p 13-15, 1975.

Descriptors: Industrial wastes, *Waste water treatment, Effluents, Organic wastes, *Biological treatment.
Identifiers: *Ozonation, *Chemical treatment, *Mechanical treatment(Wastes).

The effectiveness of treatment of the effluents from 16 organic systhesis plants in rendering them non-carcinogenic was studied. Of mechanical, biological and chemical decontamination methods, ozonization was the most effective and reliable.--Copyright 1976, Biological Abstracts, Inc.
W77-03488

FLUIDIZED WASTE INCINERATOR AND METHOD,
Shell Oil Co., Houston, Tex. (Assignee).
W. R. Pledger, and J. E. Gwyn.
United States Patent 3,994,244. Issued November 30, 1976. Official Gazette of the United States Patent Office, Vol. 952, No. 5, p 1975, November, 1976. 1 fig.

Descriptors: *Incineration, *Sewage treatment, *Sewage sludge, *Sludge disposal, *Patents, *Equipment, Waste water treatment, Joints(Connections).
Identifiers: Combustion, Conduits, Fluidized beds.

A patent has been granted for a fluidized bed incinerator for sewage sludge and similar waste liquids containing a high proportion of easily fusible salts. The equipment includes: a refractory lined vessel; means for holding dense fluidized-solids in a bed in the lower part of the vessel, with a bed supporting grate and means to force air upward through the bed; equipment to introduce a stream of feed into the fluidized bed; and effluent take-off means to communicate with the upper portion of the vessel and withdraw an effluent stream of combustion vapors and entrained solids. These take-off means have the properties of comprising a refractory-lined metal conduit which connects one end of the vessel with the other; a second conduit, communicating with the first, at about right angles; and quench water injection means adapted to spray quench water directly into the opening of the second conduit. (Kramer-FIRL)
W77-03489

VARIATIONS OF COLIFORM BACTERIA AN
OTHER POLLUTION INDICES IN SURFAC
WATERS.
Public Health Service, Washington, D.C. Wate
Quality Section.
For primary bibliographic entry see Field 5B.
W77-03539

FERMENTATION OF WASTE MATERIALS TO
PRODUCE INDUSTRIAL INTERMEDIATES,
Oak Ridge National Lab., Tenn.
A. L. Compere, and W. L. Griffith.
Available from the National Technical Informa
tion Service, Springfield, VA 22161 as CONF
750823-3, Price codes: A02 in paper copy, A01 i
microfiche. CONF 750823-3, (1975). 16 p, 1 fig,
tab, 8 ref.

Descriptors: *Recycling, *Waste treatment
*Fermentation, Acids, Organic matter, Alcohols
Technology.
Identifiers: *Lactic acid, Volatile acids, Whey.

The utilization of organic wastes by fermentatio
to produce commercially valuable acetic acid
acetone, n-butyl alcohol, ethyl alcohol, formi
acid, lactic acid salts and proprionic acid i
proposed. Production of lactic acid for use in dair
products or for production of acrylic acid an
other industrial compounds from waste sour whe
is illustrated by a bench-scale system, seeded by
kefir-delivered culture, and using a fixed-filt
bioreactor (ANFLOW unit), and an ion exchang
column. The whey lactic acid concentration wa
increased to 2.1% from 1.4% after a single passag
through the ANFLOW unit and the six-foo
column, then stripped of its lactic acid by
macroporous weak anion exchange resin. If acids
rather than salts, are desired as resin products
they can be stripped with a strong acid, such a
sulfuric acid, and regenerated with a base in
separate step. The lactic acid recovery equalle
62%. Recovery of a more concentrated lactic aci
solution is possible. Many industrial wastes coul
serve as fermentation feeds and althoug
byproduct recovery may be marginal it can b
profitable when it is coupled with the consequen
decreased sewer charges due to decreased organi
contents and SS of wastewaters. The system i
comparable to a conventional industrial sewag
treatment or water-softening unit. (Auen-Wiscon
sin)
W77-03563

THE COST OF PRODUCING EFFLUENTS TO
VARYING STANDARDS BY BIOLOGICAL
TREATMENT TECHNIQUES,
J. M. Sidwick, and J. R. Preston.
Effluent and Water Treatment Journal, Vol. 16
No. 5, p 238-241, 244-247, May, 1976. 8 fig, 5 ref.

Descriptors: *Capital costs, *Waste water treat
ment, *Biological treatment, *Activated sludge
*Biochemical oxygen demand, *Treatment facili
ties, Effluents, Standards, Mathematical studies
Cost analysis.

The capital costs of achieving various standards o
effluent by biological methods are discussed. Vari
ous mathematical fits were examined with the
assistance of a computer. Recorded and reported
costs on civil engineering schemes are rarely on
the same basis: unit costs may or may not include
ancillaries. Principal biological treatment method
are subdivided into biological filtration and ac
tivated sludge treatment. Thirty mg/liter
suspended solids and 20 mg/liter biochemical ox
ygen demand (BOD) in 5 days was taken as the
norm for full treatment. The cost per head
decreases as population increases for inlet works
Rectangular, pyramidal, and circular primary sedi
mentation tanks did not differ significantly with
regard to costs. Since the principal cost of a
biological filter is in the medium, the curve for
cost per cu m follows a predictable slope showing
reducing unit cost with increasing volume. Insuffi

nt data were available upon which to base aningful cost curves for high-rate biological fil- s using conventional medium, but conventional dia installations are less expensive in terms of ital cost than their synthetic medium counter- rts. High rate activated sludge treatment is less ensive than standard rate activated sludge atment for all population sizes. Cost decreases volume and population increase. Site costs vary m 25% of the aggregated unit costs for the aller works to 10% for the larger works. Aera- n package plants are cheaper than package nts using biological-disc methods of treatment. general, cost per population equivalent reases as unit size increases. (Snyder-FIRL)
7-03568

CENT DEVELOPMENTS IN THE USE OF LYELECTROLYTES,
B. Moll.
ter and Waste Treatment, Vol. 19, No. 9, p 39, otember, 1976. 2 tab.

scriptors: *Waste water treatment, *Sewage atment, *Sewerage, *Polyelectrolytes, eparation techniques, Solid wastes, Liquids, watering.

nthetic polyelectrolytes have received much at- tion in Britain for use in the solid-liquid separa- n process of sewage treatment. They are erally reliable in achieving a high degree of ids recovery and have been used in mechanical watering and vacuum filtration. 'In-line' dosing sludge has proved suitable for most sludge nps and eliminates the need for chemical paration and dilution tanks, thus offering con- erable cost savings. Polyelectrolytes have suc- sfully replaced traditional conditioners such as lime-coppera s combination and aluminum orohydrate. Their use has proven advantages ich include: elimination of scaling problems, in- ased press capacity, reduced chemical handling blems, elimination of inorganic conditioner-in- ced corrosion, reduction of chemical storage ce needs, and a non-contribution to ash loading en incineration is considered. It is concluded t further investigation will reveal other produc- e uses for synthetic polyelectrolytes. (Collins-RL)
7-03569

DIUM BICARBONATE NEUTRALIZES,
Barber.
e American City and County, Vol. 91, No. 11, p 55, November, 1976.

scriptors: *Waste water treatment, *Sewage atment, *Biological treatment, *Sewerage, eatment facilities, Sodium compounds, Bicar- nates, Neutralization.
ntifiers: Sodium bicarbonate.

rge amounts of waste paper fibers collecting in primary settling basin of the West Nyack, N. sewage treatment plant caused a serious ester souring problem. The system's pH had en from 7 to 4.8. Raw sewage was pumped into primary digester, but the anaerobic microor- isms were adversely affected and recovery was ubtful. About 700 lb/day of sodium bicarbonate s added and the pH began to rise, ranging from to 7.1. Alkalinity rose from less than 2000 /liter to 4000 mg/liter. Waste digestion im- ved greatly. When reasonable pH and alkalinity els were reached, about 150 lb/day of sodium arbonate were applied as a preventative. The dual addition of sodium bicarbonate was also d to clear emulsion blockage of the settling ks. Sodium bicarbonate functions as a buffer in maintenance of desired acidity-alkalinity ratios microbial activity. Sodium bicarbonate also ys a role in pH control and is an ideal medium increasing methane production in anaerobic tems and precipitating toxic metals. (Collins-RL)
7-03570

EFFECT OF HIGH DISSOLVED OXYGEN CONCENTRATION IN ACTIVATED SLUDGE SYSTEMS,
T. D. Chapman, L. C. Matsch, and E. H. Zander.
Journal Water Pollution Control Federation, Vol. 48, No. 11, p 2486-2510, November, 1976. 7 fig, 7 tab, 69 ref.

Descriptors: *Waste water treatment, *Activated sludge, *Biochemical oxygen demand, *Dissolved oxygen, *Oxygen, Basins, Biological treatment, Biomass.

An evaluation of the UNOX oxygen activated sludge system was given to prove its advantages. The system is designed to use high purity oxygen for the dissolved oxygen (DO) requirements, to use a covered basin for contact between biomass, oxygen, and waste water, to operate in the same average range of power densities as air systems but at lower ones near the end of the train to develop a well flocculated biomass, to handle a broad range of F:M loadings, and to operate at a DO level range of 2 to 6 mg/liter. Aspects discussed are the effect of DO in activated sludge, organic loading and effluent quality, settleability of OE solids and MLSS levels, sludge production nitrification, and process stability. Oxygen systems have no advantage relative to settleability, operation at higher organic loadings, or waste sludge production. But at DO levels of 4 to 6 mg/liter (oxygen system) and 1 to 2 mg/liter (air system) the following observations were made. Higher DO level oxygen systems can operate at biomass loadings (F:M) of more than twice that of air systems with the same BOD5 and SS quality effluent. Settleability of oxygen system sludge is greater, allowing higher solids loading on the clarifier with higher recycle solids and MLSS concentrations. There is also improved dewatering of oxygen activated sludge. Less sludge is produced with the oxygen system at equivalent apparent F:M ratios. It was concluded that these characteristics were due to the increased viability of the oxygen system mixed liquor resulting from increased oxygen penetration into the floc matrix. (Collins-FIRL)
W77-03571

SLUDGE DRYING BEDS ARE PRACTICAL: PART 2,
J. A. Beardsley.
Water and Sewage Works, Vol. 123, No. 8, p 42-44, August, 1976. 4 fig.

Descriptors: *Waste water treatment, *Sewage treatment, *Treatment facilities, *Sewage sludge, *Drying, Chemicals, Efficiencies, Sludge treatment.
Identifiers: *Drying beds.

Chemical conditioning is important to the efficient operation of sludge drying beds. Using polymer flocculants to treat sludge prior to bed drying offers several benefits, including increased production from existing beds, heavier loadings without blinding, reduced odor because of rapid drainage, application of variable sludges and supernate, less sludge hauling because of drier cake, and easier unloading because sludge does not form small fractured crumble. Cationic polymer flocculants are most appropriate for sewage sludges. The polymer flocculant will release large quantities of free water while forming a large well-defined floc. The flocculant ties up fine supernate solids and removes the greatest volume of liquid from the digester for a given amount of solids, prevents upsets in the primary due to recycling anaerobic colloidal solids, and provides for longer stabilization time of the remaining solids. Solution flocculants allow simpler feed systems than dry polymers, but both require dispersing and metering equipment. Chemical application has made it possible for a plant using a trickling filter and mixed sludge to switch from anaerobic to aerobic digestion without adding more sand beds. In one experiment, much more water was drained from a treated sludge bed than from a similar untreated bed. Chemical addition dramatically improved dewatering at a plant where an alum-anionic flocculant program resulted in additional solids to dewater. (See also W76-00039)(Snyser)-FIRL)
W77-03572

INHIBITING NITRIFICATION IN WASTEWATER TREATMENT PLANTS,
E. L. Stover, A. Esfandi, H. Little, and D. F. Kincannon.
Water and Sewage Works, Vol. 123, No. 8, p 56-59, August, 1976. 5 fig, 11 ref.

Descriptors: *Waste water treatment, *Biological treatment, *Activated sludge, *Biochemical oxygen demand, *Chemical oxygen demand, Treatment facilities, Pollutant identification, Nitrification.

Apparent inhibition of nitrification was studied in continuous flow and batch studies using an experimental bench-scale activated sludge unit. Many compounds inhibit nitrification by interference with the general metabolism of the cell or with the primary oxidative reactions. When the influent chemical oxygen demand (COD) to an activated sludge plant increased and a sharp increase in biological solids occurred, the nitrification efficiency of the system decreased. Glucose concentrations under 750 mg/liter COD did not change nitrification rates in batch reactors containing nitrifying microorganisms, but concentrations of 777 mg/liter and 1139 mg/liter inhibited nitrification rates in the same type systems. In completely mixed one-stage activated sludge treatment plants, substrate concentrations of this magnitude would seldom occur, and the organic substrate by itself would not inhibit the biological nitrification process in such systems. A reasonable explanation would be the production by the heterotrophic microorganisms at fast growth rates of intermediary metabolic byproducts which inhibit biological nitrification. This is supported by data from other nitrification investigations. As the influent COD or biochemical oxygen demand (BOD) concentrations to a system increase, the rate of carbonaceous microorganism growth increases and depresses the nitrification rate of the system. (Snyder-FIRL)
W77-03573

EXPERIMENTS ON WASTEWATER SEDIMENTATION,
University of Manchester Inst. of Science and Technology (England).
J. B. White, and M. R. Allos.
Journal Water Pollution Control Federation, Vol. 48, No. 7, p 1741-1752, July, 1976. 8 fig, 2 tab, 2 ref, append.

Descriptors: *Flow rates, *Sedimentation rates, *Tanks, *Waste water treatment, Suspended solids, Settling, Effluents, Clarification.
Identifiers: *Circular center-feed sedimentation tanks.

Tests were conducted to examine the performance of circular center-feed sedimentation tanks in the primary stage of waste water treatment. Major variables involved were the rate of flow through the tank, the concentration of suspended solids in the feed, and the settling characteristics of the suspension. Various tests were made on a full-sized tank with no control of these variables and in a small tank with means of controlling them. Settling column tests were also run on samples of the waste water used. Settling column tests on raw waste water had results which differed from those of discrete suspensions. Suspended solids concentrations decreased with time, and the rate of decrease lessened with time. Concentrations increased little with depth. Initial suspended solids concentrations greatly affected the degree of clarification in a given time. There was evidence of highly variable settling characteristics in waste

water. The relationship of effluent and influent concentrations and detention time in the tank tests and column tests were such that the column tests results gave an approximation of performance in the tanks. It was shown that, after two hours, only little further clarification can be expected. Other tests with reconstituted waste water indicated that the limit of concentration may decrease with decreasing surface loading. (Collins-FIRL)
W77-03574

AERATION AND OXYGEN TRANSFER IN BIOLOGICAL REACTORS,
Vanderbilt Univ., Nashville, Tenn.
W. W. Eckenfelder, Jr.
La Tribune du Cebedeau, No. 389, p 160-167, April, 1976. 5 fig, 1 tab, 14 ref.

Descriptors: *Waste water treatment, *Biological treatment, *Treatment facilities, *Aerobic treatment, *Aeration, Aerobic conditions, Oxygen, Transfer, Equipment.
Identifiers: *Oxygen transfer, *Biological reactors.

The supply of oxygen to an aerobic biological treatment system is a critical aspect of proper design and operation. Oxygen, which is sparingly soluble in water, is transferred from the gas phase to the liquid phase by diffusion and convection to a concentration in accordance with Henry's Law. Under turbulent flow conditions assuming that the resistance of the liquid film controls oxygen transfer rate, transfer of oxygen from the gas to the liquid phase is a function of the overall transfer coefficient and the oxygen deficit. When oxygen is supplied to fluidized systems treating waste water via aerobic biological oxidation, a correction factor must be defined which relates the oxygen transfer to the nature of the waste. Aeration equipment is categorized into three systems: diffused aeration, turbine aeration, and mechanical aeration. All three are discussed. Diffused aeration systems include bubbler aeration and static aeration. Air is discharged from a pipe or sparge ring beneath the rotating blades of an impeller in turbine aeration. (Snyder-FIRL)
W77-03575

FLOTATION FOR WATER AND WASTE-WATER TREATMENT,
J. Pullin.
Surveyor, Vol. 4383, No. 147, p 39-40, June 11, 1976. 2 fig.

Descriptors: *Waste water treatment, *Sewage treatment, *Sewerage, *Treatment facilities, *Flotation, *Water treatment, Waste water(Pollution), Bubbles.
Identifiers: *Microflotation.

Microflotation is based on the idea that, for effective flotation, the bubbles which take the solids or oil particles to the surface should be numerous but small in size. After chemical treatment and aeration, the effluent flows down a 10 m deep divided shaft, which keeps the downward flowing effluent away from the effluent which rises into the flotation tank. Air is injected at the bottom of the shaft. Floc agglomeration begins when the effluent, free from undissolved air, begins to rise up the shaft toward the flotation tank, and gas bubbles form as the gas content of the effluent exceeds the saturation level. A dissolved air flotation plant has been in continuous operation at a sewage treatment works for 3 years with few operational problems. The plant produced a consistently good sludge float averaging 4% dry solids, good effluent and solids removal efficiencies of over 99.7%. After a series of trials using different polyelectrolytes, Zetag 94 was used as a flotation aid. It might be possible to use flotation units to elutriate and thicken digested sludge prior to mechanical dewatering, instead of using elutriation tanks. Operational experience in potable water treatment is also discussed. Practical examples are included. (Snyder-FIRL)
W77-03576

WASTEWATER'S FUTURE IS CLOUDY,
W. J. Storck.
Water and Wastes Engineering, Vol. 13, No. 7, p 20-22, July, 1976.

Descriptors: *Waste water treatment, *Sludge disposal, *Water reuse, Recycling, Potable water, Landfill, Incineration, Cost analysis, Treatment facilities.

A great deal of concern has been expressed for the future development of waste water treatment systems. The major problem is that research will probably be lessened in order to rush practical development. The primary concern is for finding means of reusing treated waste water instead of merely disposing of it. One projection involves the direct reuse of waste water as potable water. This depends upon public acceptance of the idea as well as the introduction of systems which can provide water of the required quality. Sludge also receives attention as a product of waste water treatment. It is suggested that its use as landfill or fertilizer may be extremely viable alternatives. Pyrolysis and the use of sludge--derived methane gas are also considered. Any system or method must be cost effective. (Collins-FIRL)
W77-03577

KEEP COOL WITH SEWAGE EFFLUENT - A TWO-WAY SAVING OF WATER,
For primary bibliographic entry see Field 3E.
W77-03578

OXYGEN TRANSFER IN A 23-METER BUBBLE COLUMN,
Idaho Univ., Moscow.
M. L. Jackson, D. R. James, and B. P. Leber, Jr.
American Institute of Chemical Engineers Symposium Series, Vol. 71, No. 151, p 159-165, 1975. 4 fig, 2 tab, 5 ref.

Descriptors: *Aeration, *Waste water treatment, *Oxygen, Transfer, *Efficiencies, Waste treatment, Performance, Evaluation, Pulp and paper industry, Industrial wastes, Bubbles.

Oxygen transfer efficiencies in an aeration column (7.6 cm in diameter) were observed for liquid depths up to 21 m. Although higher air rates and liquid depths increased the oxygen transfer rate and overall efficiency, the transfer area was reduced with increasing liquid level because of the higher pressures on the entering bubbles. A diffuser provided 96% oxygen transfer at 8 m, and a pipe inlet provided 63% transfer at a liquid depth of 21 m. The performance of the narrow column may also be used to judge applications to large diameter aeration tanks with multiple inlets. The design of a plant for the treatment of 15,000 cu m/day of waste from a sulfite paper mill based on the results observed for the narrow column was analyzed in terms of treating the same waste in a lagoon; the results were favorable for tall tank aeration. (Kreager-FIRL)
W77-03579

AN ECONOMIC EVALUATION OF DEEP TANK AERATION FOR WASTEWATER TREATMENT,
Idaho Univ., Moscow.
L. L. Edwards, B. P. Leber, Jr.., and M. L. Jackson.
American Institute of Chemical Engineers Symposium Series, Vol. 71, No. 151, p 154-157, 1975. 4 tab, 13 ref.

Descriptors: *Aeration, *Cost analysis, *Waste water treatment, *Stabilization, *Oxygenation, Transfer, Oxygen, Economics, Model studies, Pulp and paper industry, Industrial wastes, Liquid wastes, Waste treatment.
Identifiers: Deep tank aeration.

An economic comparison between a deep-tan aeration system and a conventional aerated st bilization basin for the treatment of 4.5 million ga lons/day of waste water from a sulfite pulp mill presented. The deep-tank aeration system is reality a vertical flow reactor which takes a vantage of the large partial pressure driving for for oxygen transfer at the bottom of the tank. Th analysis consists of modeling oxygen transfer deep tanks and designing a minimum-cost dee tank treatment process. The deep tank system designed with standby capacity for pumps, com pressors, deep tanks, and a settling tank to insu continuous operation. The economic analysis i dicates that the deep-tank system requires capital investment of $647,000 which is 10% low than that for the aerated basin. The deep-tan system also results in a 58% reduction in total ele trical energy usage. (Kreager-FIRL)
W77-03580

CONDUCTING SEWER SYSTEM EVALU TIONS FOR SMALL SYSTEMS,
P. E. Darnell.
Water and Sewage Works, Vol. 123, No. 11, p 6 71, November, 1976.

Descriptors: *Sewerage, *Sewers, *Infiltratio *Inflow, *Evaluation, Data processing, Analyti techniques, Monitoring, Inspection, Cleanin Repairing, Surveys, Cost analysis, Flow
Identifiers: *Infiltration/inflow.

Various aspects of an Infiltration/Inflow Analy were described. This analysis applied to sew systems with a total installed length of lines 200,000 ft or less. Its function was to determi system susceptibility to excessive infilt tion/inflow. Detailed descriptions were given f the three phases of analysis (evaluation surve physical survey, and data analysis). Accurate flo data was a prime prerequisite in making all det minations. Smoke testing for leaks, observati during a rainfall or a rainfall simulation, and mo toring of groundwater levels in the system we important considerations. Preliminary data ana sis involved an estimation of the quantity of wa needed in a line section to justify costs of cleani inspecting, and rehabilitating the line. Conside tion was also given to the option of replaceme work. This was followed by a preparatory cleani and internal inspection of the lines. Advantag and disadvantages of cleaning systems were co pared. These activities were followed by evaluation survey and the preparation of cost es mates for needed work. (Collins-FIRL)
W77-03581

NATURE PRESERVATION ACTIVITY RR I VESTIGATION: PART 6. A MODIFI METHOD OF MEASURING THE CHEMIC OXYGEN DEMAND GIVES A HIGH ANALY CAL CAPACITY, (IN SWEDISH),
Uppsala Kommun Naturvardsverkets RR-Und sokning (Sweden). Algestlab. Fysiol. Bot.
For primary bibliographic entry see Field 5A.
W77-03589

5E. Ultimate Disposal Of Wastes

RENOVATION OF MUNICIPAL WAST WATER FOR GROUNDWATER RECHAR BY THE LIVING FILTER METHOD,
Pennsylvania State Univ., University Park. In for Research on Land and Water Resources.
For primary bibliographic entry see Field 5D.
W77-03147

LIMING FARMLAND WITH CALCIU SLUDGE,
Missouri Univ., Columbia. Dept. of Civil E gineering.
For primary bibliographic entry see Field 5D.
W77-03163

ID BASED SEWAGE SLUDGE MANAGE-
NT ALTERNATIVES FOR LOS ANGELES:
LUATION AND COMPARISON,
fornia Univ., Los Angeles. School of
nitecture and Urban Planning.
primary bibliographic entry see Field 5D.
-03289

IDUAL WASTE MANAGEMENT
EARCH AND PLANNING PROJECTS, SEP-
IBER 1975,
ironmental Protection Agency, Washington,
. Water Planning Div.
primary bibliographic entry see Field 5B.
-03355

CTIONS OF HEAVY METALS WITH
LS WITH SPECIAL REGARD TO THEIR
LICATION IN SEWAGE WASTES,
bourne Univ., Parkville (Australia). Dept. of
cultural Chemistry.
primary bibliographic entry see Field 5B.
-03359

DGE COLLECTOR AND LIGHT LIQUID
ARATOR-FROM SEWAGE WITH TWO
NKS IN SINGLE HOUSING AND COVER.
primary bibliographic entry see Field 5D.
-03405

MBINED PROCESS OF PYROLYSIS AND
MBUSTION FOR SLUDGE DISPOSAL,
to Univ. (Japan). Faculty of Engineering; and
to Univ. (Japan). Dept. of Sanitary Engineer-

primary bibliographic entry see Field 5D.
-03415

DGE DEWATERING PILOT PLANT
IGN, PART I,
Jersey Inst. of Tech., Trenton. Dept. of Civil
Environmental Engineering.
primary bibliographic entry see Field 5D.
-03416

DGE INCINERATION.
ironmental Science and Technology, Vol. 10,
12, p 1080-1082, November, 1976. 2 tab, 6 ref.

criptors: *Sewage treatment, *Sewage sludge,
dge treatment, *Incineration, *Sludge
osal, Metals, Pesticides, Polychlorinated
enyls.
ntifiers: Multiple-hearth incinerators,
dized-bed incinerators, Particulates.

neration of sewage plant sludge is disussed and
pared to other methods of sludge control. EPA
ies have proved sludge incineration adequate
neeting present air quality standards. This is
of both multiple-hearth and fluidized-bed in-
rators. A 1972 study noted that most sludge in-
rators of the time did not use high-efficiency
iculate control devices and traces and small
ntities of specific metals, PCBs, and pesticides
d be found in stack emissions. Particulate con-
is a part of all sewage sludge incinerators now.
st metals either oxidize and are collected in the
om ash or are collected during the particulate
bbing phase. Sludge incinerators have been
ven to destroy 99% of pesticides and 94% of
ds when they are coincinerated with sludge. In
ns of overall economics, sludge incinerators
e proven to be half as costly as land application
Boston, Massachusetts. The same study rated
neration slightly better in terms of environ-
ntal impacts. It is also the best alternative to
an disposal in the near future. The ash is free of
icides, viruses, and pathogens, and easily
sported to landfill sites. (Collins-FIRL)
-03419

WASTE-TREATMENT 'FARM' HARVESTS FIRMS.
For primary bibliographic entry see Field 5D.
W77-03420

USE OF SLUDGE LEFT AFTER WASTE WATER DECANTATION AS A FERTILIZER OR SOIL CONDITIONER (LES BOUES DE DECANTATION D EAU RESIDUAIRES UTILISEES COMME FERTILISANT OU COMME CONDITIONNEUR DE SOLS),
For primary bibliographic entry see Field 5D.
W77-03421

SLUDGE - WHERE WILL WE PUT IT,
CH2M/Hill, Corvallis, Oreg.
R. F. Haines.
Water and Wastes Engineering, Vol. 13, No. 7, p 60, 62, 64, 66, July, 1976. 2 fig.

Descriptors: *Sludge disposal, *Sludge treatment, *Waste water treatment, *Costs, Landfills, Lagoons, Recycling, Fertilizer, Incineration.

The problem of sludge disposal has become one of major importance. Estimates place the cost of sludge treatment and disposal at 25 to 50% of total waste water management costs in the United States. Until now, purification was the main objective of treatment. The EPA is setting standards for treatment and the management of resultant residues. Landfill disposal is losing ground to other disposal options. Lagooning, ocean disposal, use as fertilizer, use of sludge-derived methane, and incineration have become attractive alternate methods. Future emphasis will be on improved operating techniques, recycling and minimizing waste streams, and on holding down water costs. Social, economic, and environmental factors must be included in all future planning. (Collins-FIRL)
W77-03424

SMALL VILLAGE GETS ADVANCED TREATMENT.
For primary bibliographic entry see Field 5D.
W77-03440

LARGE SCALE SEWAGE TREATMENT PLANT WITH SLUDGE INCINERATOR.
For primary bibliographic entry see Field 5D.
W77-03442

AN OPERATOR'S APPROACH TO AEROBIC DIGESTER SUPERNATANT DISPOSAL PROBLEMS,
Montgomery County Sewer Authority, Oaks, Pa.
For primary bibliographic entry see Field 5D.
W77-03449

INTERMITTENT SAND FILTRATION OF HOUSEHOLD WASTERWATER,
Wisconsin Univ. -Masison. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5D.
W77-03452

SEWAGE SLUDGE TREATMENT SYSTEM,
California Inst. of Tech., Pasadena, Calif. (Assignee).
For primary bibliographic entry see Field 5D.
W77-03487

FLUIDIZED WASTE INCINERATOR AND METHOD,
Shell Oil Co., Houston, Tex. (Assignee).
For primary bibliographic entry see Field 5D.
W77-03489

SLUDGE DRYING BEDS ARE PRACTICAL: PART 2,
For primary bibliographic entry see Field 5D.
W77-03572

WASTEWATER'S FUTURE IS CLOUDY,
For primary bibliographic entry see Field 5D.
W77-03577

THOSE NASTY PHOSPHATIC CLAY PONDS,
For primary bibliographic entry see Field 5G.
W77-03596

5F. Water Treatment and Quality Alteration

RESEARCH NEEDS FOR THE POTABLE REUSE OF MUNICIPAL WASTEWATER,
Colorado Univ., Boulder. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5D.
W77-03356

NATIONAL SAFE DRINKING WATER STRATEGY, ONE STEP AT A TIME.
Environmental Protection Agency, Washington, D.C. Office of Planning and Evaluation.
For primary bibliographic entry see Field 5G.
W77-03357

PRELIMINARY ASSESSMENT OF SUSPECTED CARCINOGENS IN DRINKING WATER: REPORT TO CONGRESS.
Environmental Protection Agency, Washington, D.C. Office of Toxic Substances,
For primary bibliographic entry see Field 5A.
W77-03360

PRECAUTIONS TO BE TAKEN IN THE CONSTRUCTION AND MAINTENANCE OF WATER SUPPLY AND SEWER SYSTEMS (PRECAUTIONS A PRENDRE DANS LA CONSTRUCTION ET L'ENTRETIEN DES RESEAUX D' AQUEDUC ET D' EGOUT),
For primary bibliographic entry see Field 8G.
W77-03400

'GIVE FLOTATION A TRY' WAS CHALLENGED.
New Civil Engineer, p 16, June 10, 1976.

Descriptors: *Flotation, *Filtration, *Water treatment, Water quality, Separation techniques, Flocculation, Surface waters, Sludge disposal, Sludge treatment, Treatment facilities, Sedimentation, Costs.

The water authorities of Britain were urged to consider flotation as an alternative to filtration in water treatment. Claims based on Scandinavian experiences indicated that treated water quality is such that final filtration is sometimes unnecessary. It was suggested that thorough flocculation and separation tests would speed use of the flotation process in most surface water treatment plants. Advocates of the system have claimed several advantages for the process: smaller tank sizes with surface loading up to 10 times that of sedimentation tank loading, reduced chemical usage due to lighter flocs used, higher treated water quality from better solids recovery, and drier sludge. However, there would be higher energy costs and increased maintenance requirements due to the greater mechanical equipment needed. With the benefits of improved sludge handling and cheaper disposal, flotation has some cost advantage over sedimentation and, if filtration could also be replaced, the system could provide substantial financial savings. (Collins-FIRL)
W77-03439

MODEL STUDIES IN AQUEOUS CHLORINATION: THE CHLORINATION OF PHENOLS IN DILUTE AQUEOUS SOLUTIONS,
Waterloo Univ. (Ontario). Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W77-03458

EFFECT OF WATER CHLORINATION UPON LEVELS OF SOME POLYNUCLEAR AROMATIC HYDROCARBONS IN WATER,
Imperial Coll. of Science and Technology, London (England). Dept. of Public Health Engineering.
R. M. Harrison, R. Perry, and R. A. Wellings.
Environmental Science and Technology, Vol 10, No 12, p 1151-1156, November, 1976. 12 fig, 3 tab, 16 ref.

Descriptors: *Water treatment, *Chlorination, *Treatment facilities, *Temperature, Hydrogen ion concentration, Laboratory tests, Sampling, Water analysis, Analytical techniques, Organic compounds.
Identifiers: Polynuclear aromatic hydrocarbons(PAH).

Eight polynuclear aromatic hydrocarbons (PAH) were subjected to chlorination and the results were evaluated against PAH removal at a water treatment plant. In lab tests, PAH's and a chlorinating agent were added to three aliquots of distilled water with one aliquot of distilled water as a blank. Various values of temperature, contact time, and reagent concentrations were tested. For comparison, samples from water treatment works were collected in glass vessels and extracted and analyzed by gas-liquid chromatography. The study revealed a 64-88% PAH removal by chlorination as compared to water treatment plant removal of about 60%. This difference is probably due to impurities in the water. Temperature, pH, and the concentrations of PAH and chlorinating agent have varying effects on PAH removal. Efficient filtration in treatment plants removes a substantial amount of PAH and chlorination furthers the process. (Collins-FIRL)
W77-03459

MONITORING OF COMMUNITY WATER SUPPLIES,
Ontario Ministry of the Environment, Toronto. Pollution Control Branch.
For primary bibliographic entry see Field 5A.
W77-03463

INVESTIGATIONS ON THE IMPORTANCE OF THE ORGANIC CHLORO-COMPOUNDS AND THEIR ADSORBABILITY (UNTERSUCHUNGEN ZUR BEDEUTUNG DER ORGANISCHEN CHLORVERBINDUNGEN UND IHRER ADSORBIERBARKEIT),
For primary bibliographic entry see Field 5A.
W77-03465

ULTRAVIOLET PURIFICATION SYSTEM.
For primary bibliographic entry see Field 5A.
W77-03467

RAPID DETECTION OF BACTERIAL ENDOTOXINS IN DRINKING WATER AND RENOVATED WASTE WATER,
Texas Univ. Health Science Center at San Antonio. Dept. of Pathology.
For primary bibliographic entry see Field 5A.
W77-03474

FLOTATION FOR WATER AND WASTEWATER TREATMENT,
For primary bibliographic entry see Field 5D.
W77-03576

5G. Water Quality Control

ENVIRONMENTAL IMPACT OF LAND USE ON WATER QUALITY, PROGRESS REPORT,
Allen County Soil and Water Conservation District, Fort Wayne, Ind.
J. E. Lake, and J. Morrison.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-248 104, Price codes: A11 in paper copy, A01 in microfiche. Report EPA-905/9-75-006, November 1975. 231 p, 106 fig, 90 tab, append. EPA G-005103.

Descriptors: *Water quality, *Land use, Agriculture, *Erosion, *Indiana, Sediments, Sedimentation, Suspended solids, Watersheds(Basins), Rivers, Nutrients, Pollutants, Fertilizers, Social aspects, Economics, Economic impact, Soil conservation, Farm management, Water pollution, Water pollution sources, Water pollution control.
Identifiers: *Black Creek(Ind), *Maumee River Basin(Ind).

The Black Creek Sediment Study is an attempt to discover the role that agricultural operations play in the pollution of the Maumee River and to show how that role can be diminished through the application of significant land treatment practices. The project represents a multi-agency, multi-discipline approach to the total problem of non-point source pollution. The problem of non-point source pollution is becoming more and more important in the nation's overall effort to clean up the degraded streams and lakes. As major point sources of pollution such as industries and municipalities are brought under control and begin to contribute less and less of the total pollutant load, the necessity of controlling pollution which originates from small, hard-to-identify sources becomes more and more critical. Our understanding of the mechanisms by which pollutants from diverse small sources is carried into the nation's waterways to become - in the aggregate - a large problem is not so advanced as is our understanding of the monitoring and control of point-source pollution. The Black Creek project is intended to provide significant data on which future decisions about efforts to control this type of pollution - if it indeed can be controlled at a cost that all citizens are willing to bear - can be based. Two years of operation of this project were described and significant results were reported. (Sims-ISWS)
W77-03106

EFFECTS OF POTASSIUM ON ADULT ASIATIC CLAMS, CORBICULA MANILENSIS,
Illinois Natural History Survey, Urbana.
For primary bibliographic entry see Field 5C.
W77-03119

LOCAL WATER SYSTEMS ARE FREQUENTLY NEGLECTED,
Illinois Univ. at Urbana-Champaign. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6B.
W77-03121

UTILIZATION OF MUNICIPAL WASTE WATER FOR FROTH FLOTATION OF COPPER AND MOLYBDENUM SULFIDES,
Arizona Bureau of Mines, Tucson.
For primary bibliographic entry see Field 5D.
W77-03132

APPLICATION OF A MODEL FOR LAYOUT AND DESIGN OF SEWER SYSTEMS,
Illinois Univ. at Urbana-Champaign. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W77-03133

PRACTICAL ALTERNATIVES TO 2,4,5-T FOR CHEMICAL CONTROL OF BRUSH ALONG DRAINAGE DITCHES AND GENERAL WATERSHED USE,
Purdue Univ., Lafayette, Ind. Water Resources Research Center.
D. J. Morre.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 217 Price codes: A02 in paper copy, A01 in microfiche Purdue Water Resources Research Center Technical Report No. 83, 1976, 11 p, 2 fig, 3 tab. OWRT A-049-IND(1).

Descriptors: *Herbicides, *Brush control Drainage, *2-4-D, *2-4-5-T, *Chemcontrol Watershed management, Organic compounds.
Identifiers: Dicamba mixtures, Krenite mixtures Environmental safety, *Drainage ditches.

The objective was to provide a practical alterna tive to 2,4,5-T as a brush control agent for gener watershed use. Two such agents are described an specific recommendations are made for ditchban and other watershed uses. The agents are (1) a 3 way Phenoxy-Dicamba mixture consisting o equal parts of an amine salt formulation of 2,4-D (2,4-dichlorophenoxyacetic acid), 2,4,5 TP (Silve or 2,4,5-trichlorophenoxypropionic acid) an dicamba (Banvel or 3,6-dichloro-o-anisec acid and (2) Krenite (ammonium ethyl ca bamoylphosphonate) plus a nonionic surfactan (Surfactant WK, Tween 20, or Triton X-100 o equivalent product). The 3-WAY Mix gives th broadest control of species; Krenite has a slig edge in overall safety, but is restricted to use fo ground application.
W77-03168

MULTIPLE USE IN THE SOUTHER COASTAL PLAINS IN THE UNITED STATES,
Georgia Univ., Athens. School of Fores Resources.
For primary bibliographic entry see Field 4C.
W77-03173

OLYMPIC ALLIANCE OIL SPILLAGE,
Oil Pollution South East Kent, Dover (England).
For primary bibliographic entry see Field 5C.
W77-03195

PHYSIOCHEMICAL AND BIOLOGICAL CON DITIONS IN TWO OKLAHOMA RESERVOIR UNDERGOING ARTIFICIAL DESTRATIFICA TION,
Oklahoma State Univ., Stillwater. Dept. o Agriculture Engineering.
For primary bibliographic entry see Field 2H.
W77-03208

ORGANIC PHOSPHORUS IN LAKES,
Wisconsin Univ., Madison. Water Chemistry Lab
For primary bibliographic entry see Field 5C.
W77-03210

LAND BASED SEWAGE SLUDGE MANAGE MENT ALTERNATIVES FOR LOS ANGELES EVALUATION AND COMPARISON,
California Univ., Los Angeles. School o Architecture and Urban Planning.
For primary bibliographic entry see Field 5D.
W77-03289

ALLATOONA LAKE, DESTRATIFICATIO EQUIPMENT TEST REPORT.
Army Engineer District, Savannah, Ga.
Available from the National Technical Informa tion Service, Springfield, VA 22161 as ADA-02 883, Price codes: A05 in paper copy, A01 i microfiche. June 1973. 73 p, 43 fig, 9 tab, 11 ref.

riptors: *Water quality, *Lakes, *On-site in-gations, *Georgia, *Destratification, On-site collections, Surveys, Evaluation, Instrumen-, Data collections, Reservoirs, Stratification, lved oxygen, Water temperature, Nitrates, es, Nitrogen, Manganese, Carbon dioxide, s, Air, Biota, Plankton, Phosphates, Al-ty, Hydrogen ion concentration, Iron, Ther-tratification, Thermocline.
ifiers: *Allatoona Lake(Geo).

perimental field investigation was conducted e Allatoona Lake Project during 1968, 1969, 970. The purposes of the investigation were: determine the effects of the operation of atification equipment, specifically a diffused mp, on the water quality of Allatoona Lake eleases therefrom, and (2) to develop criteria esign and operation of similar equipment at impoundment projects. The diffused air was located about 2,000 feet upstream from Allatoona Dam. The destratification results evaluated using available data of the project 966 and 1970, a mathematical model for pre-g water temperature, and a multiple regres-model for predicting dissolved oxygen. Dis-d oxygen isopleths of the Allatoona Lake ed that the diffused air pump operation bly affected dissolved oxygen concentrations zone extending about four miles upstream the dam. The diffused air pump operation ed the stability, or intensity, of thermal fication in the lake. Operation of the air pump ingly had little short term effect on the ic and planktonic communities within the Qualitative studies of the benthic biota stream from the dam indicated a more se community during 1968 and 1969, possibly the increased dissolved oxygen in the ses from the lake. Bacteriological data ob-d in the lake near the diffuser units did not any significant effect of artificial destratifi-n on coliform density or vertical distribution ese bacteria. (See W77-03307 thru W77-03310)
phreys-ISWS)
03306

ATOONA LAKE, DESTRATIFICATION IPMENT TEST, APPENDIX A, OPERA-AL AND WATER QUALITY DATA, 1968.
Engineer District, Savannah, Ga.
lable from the National Technical Informa-Service, Springfield, VA 22161 as ADA-022 Price codes: A12 in paper copy, A01 in fiche. February 1969. 273 p.

riptors: *Basic data collections, *Reservoirs, er quality, *Georgia, Destratification, Equip-, Operations, Meteorological data, Precipita-Atmospheric), Wind velocity, Solar radiation, oration, Air temperature, Water levels, r temperature, Dissolved oxygen, Hydrogen concentration, Conductivity, Turbidity, emical oxygen demand, Hardness(Water), inity, Color, Nitrogen, Carbon dioxide, orms, Secchi disks, Sulfides, Phytoplankton, phates, Iron, Manganese.
ifiers: *Allatoona Lake(Geo).

ndix A contained tabulated data obtained in for an experimental field investigation con-d at the Allatoona Lake Project. Data tabu-for operation of destratification equipment ded total KW-Hrs input, compressor hours tion, compressor pressure, compressor air and air temperature at compressor manifold. rvoir and meteorological data included pool tion, precipitation, maximum and minimum emperature, wind velocity, and total solar tion. Water quality data included water tem-ure, dissolved oxygen, pH, conductivity, tur-, total and dissolved iron, total and dissolved anese, 2-day BOD, 5-day BOD, total hard-as CaCO3, total alkalinity as CaCO3, color, le, carbon dioxide, total and dissolved phate, kjeldahl (N), NH3-N, NO3 + NO2, and fecal coliform per 100 ml, fecal streptococci, secchi disc readings, benthos standing crop, and phytoplankton population. (See also W77-03306) (Humphreys-ISWS)
W77-03307

ALLATOONA LAKE, DESTRATIFICATION EQUIPMENT TEST, APPENDIX B, OPERATIONAL AND WATER QUALITY DATA, 1969.
Army Engineer District, Savannah, Ga.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-022 925, Price codes: A12 in paper copy, A01 in microfiche. February 1970. 251 p.

Descriptors: *Basic data collections, *Reservoirs, *Water quality, *Georgia, Destratification, Equipment, Operation, Meteorological data, Precipitation(Atmospheric), Wind velocity, Solar radiation, Evaporation, Air temperature, Water levels, Water temperature, Inflow, Cooling water, Humidity, Discharge(Water), Dissolved oxygen, Hydrogen ion concentration, Conductivity, Turbidity, Chemical oxygen demand, Iron, Manganese, Hardness(Water), Alkalinity, Nitrogen, Carbon dioxide, Coliforms, Phosphates, Sulfides, Secchi disks.
Identifiers: *Allatoona Lake(Geo).

Appendix B contained tabulated data obtained in 1969 for an experimental field investigation conducted at Allatoona Lake Project. Data tabulated for operation of destratification equipment included total KW-Hrs input, compressor hours operation, compressor pressure, compressed air flow, and air temperature at compressor manifold. Reservoir and meteorological data included maximum and minimum air temperatures, maximum and minimum relative humidity, wind velocity, precipitation, pan evaporation, cooling water temperature, total solar radiation, pool elevation, tailwater elevation, total inflow, and total discharge. Water quality data included water temperature, dissolved oxygen, pH, conductivity, turbidity, total and dissolved iron, total and dissolved manganese, COD, CO2, total hardness as CaCO3, total alkalinity as CaCO3, sulfide, total and dissolved phosphate, kjeldahl (N), Nh3-N, NO3 + NO2, total and fecal coliform per 100 ml, and secchi disc readings. (See also W77-03306) (Humphreys-ISWS)
W77-03308

ALLATOONA LAKE, DESTRATIFICATION EQUIPMENT TEST, APPENDIX C, OPERATIONAL AND WATER QUALITY DATA, 1970.
Army Engineer District, Savannah, Ga.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-022 926, Price codes: A07 in paper copy, A01 in microfiche. February 1971. 117 p.

Descriptors: *Basic data collections, *Reservoirs, *Water quality, *Georgia, Destratification, Meteorological data, Precipitation(Atmospheric), Wind velocity, Solar radiation, Evaporation, Air temperature, Water levels, Inflow, Discharge(Water), Cooling water, Humidity, Water temperature, Dissolved oxygen, Hydrogen ion concentration, Conductivity, Turbidity, Iron, Manganese, Chemical oxygen demand, Carbon dioxide, Hardness(Water), Alkalinity, Nitrogen, Phosphates, Sulfides, Coliforms, Secchi-disks, Light penetration.
Identifiers: *Allatoona Lake(Geo), Total organic carbons.

Appendix C contained tabulated data obtained in 1970 for an experimental field investigation conducted at the Allatoona Lake Project. Reservoir and meteorological data tabulated included pool elevation, tailwater elevation, total discharge, total inflow, precipitation, pan evaporation, maximum and minimum air temperatures, cooling water temperature, total solar radiation, maximum and minimum relative humidity, and wind velocity. Water quality data included water temperature, dissolved oxygen, pH, conductivity, turbidity, total and dissolved iron, total and dissolved manganese, COD, CO2, total hardness as CaCO3, total alkalinity as CaCO3, sulfide, total and dissolved phosphate, kjeldahl (N), NH3-N, NO3 + NO2, total and fecal coliform per 100 ml, secchi disc readings, effective light penetration, and TOC. (See also W77-03306) (Humphreys-ISWS)
W77-03309

ALLATOONA LAKE, DESTRATIFICATION EQUIPMENT TEST, APPENDIX D, EFFECTS OF ARTIFICIAL DESTRATIFICATION ON TEMPERATURE AND DISSOLVED OXYGEN IN ALLATOONA RESERVOIR.
Associated Water and Air Resources Engineers, Inc., Nashville, Tenn.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-022 927, Price codes: A07 in paper copy, A01 in microfiche. June 1971. 139 p, 16 fig, 8 tab, 31 ref, 1 append. DACW 21-70-C-0008.

Descriptors: *Water quality, *Reservoirs, *Model studies, *Water temperature, Computer programs, Mathematical models, Analytical techniques, Equations, Dissolved oxygen, Forecasting, Lakes.
Identifiers: *Allatoona Lake(Geo).

Field studies were conducted at the Allatoona Lake Project during 1968, 1969, and 1970 to investigate the feasibility of and effects resulting from use of diffused air pump destratification equipment on the lake water quality. Dissolved oxygen and water temperatures within the reservoir and in its releases are of primary importance as measures of the water quality. Appendix D describe a water temperature predictive model that had been developed. The goal was to use 1970 Allatoona data to verify the model's applicability to Allatoona, and then to use the model to predict 1969 temperatures in the reservoir. The predicted results indicated that calculated values do follow the trend of observed values, but the results were too crude to be used for anything except generalized predictions. The assumptions made in the model were too coarse, and a more satisfactory model for oxygen content must be sought. An appendix contained the details for the deep reservoir simulation model computer program. (See also W77-03306) (Humphreys-ISWS)
W77-03310

ANALYTICAL STUDIES FOR ASSESSING THE IMPACT OF SANITARY SEWAGE FACILITIES OF DELAWARE COUNTY, OHIO,
Enviro Control, Inc., Rockville, Md. Environmental Studies Group.
For primary bibliographic entry see Field 5D.
W77-03353

NATIONAL SAFE DRINKING WATER STRATEGY, ONE STEP AT A TIME.
Environmental Protection Agency, Washington, D.C. Office of Planning and Evaluation.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-250 436, Price codes: A05 in paper copy, A01 in microfiche. May, 1975. 77 p, 2 fig, 5 tab.

Descriptors: *Legislation, *Potable water, *Public health, *Water quality standards, *Water policy, Groundwater, Underground, Injection, Programs, Federal project policy, Federal government, *Water pollution control.
Identifiers: Safe Drinking Water Act.

A safe drinking water strategy which has been developed to clarify the Environmental Protection Agency's policy with respect to implementing the Safe Drinking Water Act is described. The strategy proposes the following principles for implementing the Act: a commitment to give highest priority to public health matters; the involvement of states, local governments, and consumers in all

aspects of the program; the consideration of worst problems first; a consideration of the costs involved in all phases of the program; maximum utilization of existing state and local water supply control programs; decentralization of decision-making to Environmental Protection Agency regional offices; a consideration of the environmental side effects of actions taken under the Act; and the minimization of 'red-tape' in all actions. The Environmental Protection Agency also plans to implement an underground injection control program prescribed by the Act with the same step-by-step approach. (Kreager-FIRL)
W77-03357

DELAWARE 1975 STATE WATER QUALITY INVENTORY,
Department of Natural Resources and Environmental Control, Dover, Dela. Div. of Environmental Control.
N. C. Vasuki, and J. L. Pase.
April 1975. 219 p. 59 fig., 3 tab., 29 charts, 2 ref.

Descriptors: *Water quality standards *Delaware, Federal Water Pollution Control Act, Water pollution, Eutrophication, Sedimentation, Coliforms, Water quality, Waste water treatment, Costs, Pollution abatement, Surveys.
Identifiers: *State Water Quality Inventory(Delaware), *Nonpoint source pollution.

Delaware water quality was assessed in accordance with the requirements of the Federal Water Pollution Control Act Amendments of 1972. Water quality in Delaware was generally considered good. A major exception was a portion of the Delaware River, which will require upgrading of major Pennsylvania and New Jersey treatment facilities. Of the 20 segments in the stae, 6 appeared to meet all or most water quality criteria, 7 have had occasional problems, and 7 have had continuing problems in more than one water quality parameter. The tidal portion of ten segments were significantly affected by non-point source pollution from natural estuarine system processes. Excess bacteria counts were the major surface water problem, resulting primarily from urban and rural runoff, and waterfowl and wildlife. Lake degradation due to sedimentation and eutrophication was also significant. Heavy metals and toxic materials were not major problems. Point source discharge was important in certain segments, particularly those with limited assimilative capacity. Leachate from landfills, severe drawdown from wells in coastal areas, and on-site waste disposal systems contributed to contamination of groundwater aquifers. Major water quality accomplishments during the 1970-1974 period were reported along with cost estimates of providing wastewater treatment facilities through 1990. (Luedtke-Wisconsin)
W77-03378

WATER POLLUTION SURVEILLANCE IN THE UNITED STATES. REPORT NUMBER 1, MISSOURI RIVER MAIN STEM, 1958-1962.
Public Health Service, Washington, D. C. Water Quality Section.
For primary bibliographic entry see Field 5A.
W77-03379

GREAT LAKES WATER QUALITY; FOURTH ANNUAL REPORT TO THE INTERNATIONAL JOINT COMMISSION.
International Joint Commission-United States and Canada. Great Lakes Water Quality Board.
July 1976. 162 p. 19 tab., 9 fig., 4 append.

Descriptors: *International Joint Commission, Great Lakes, Governments, Canada, Water law, Legal aspects, International waters, International law, Water quality, Water quality control, International commissions, Water pollution effects, Dredging, Land use, Navigation, Toxicity, Toxins.
Identifiers: *Great Lakes Water Quality Board.

A comprehensive review is made of the quality of the U.S.-Canadian boundary waters and of programs and problem areas for which attention is mandated by the countries' Great Lakes Water Quality Agreement. Detailed examinations are provided for nearshore problem areas, programs for the construction of municipal wastewater treatment plants, measures to reduce phosphorus inputs to the lakes and industrial waste treatment programs. Other problem areas covered deal with toxic substances and radioactivity in the Great Lakes and with government programs to reduce their impact on the boundary waters. Dredging, land use and shipping activities are reviewed for their impact on water quality in the region. To mark the start of the fifth year of the agreement, the Great Lakes Water Quality Board presents a proposed framework for completing the implementation of the pact and for improving its effectiveness. Strategies are presented to cope with new problems or with those which might emerge in the future. Revised water quality objectives are proposed, along with an International Great Lakes Surveillance Program designed to provide basic information needed to show progress in achieving the objectives. (Harris-Wisconsin)
W77-03383

ORIGIN OF NITROGEN POLLUTION IN SURFACE AND WASTE WATERS (ORIGINES DES POLLUTIONS AZOTEES DANS LES EAUX SUPERFICIELLES ET LES EAUX USEES).
For primary bibliographic entry see Field 5D.
W77-03423

INFILTRATION/INFLOW - THE KANSAS CONNECTION.
Black and Veatch, Kansas City, Mo.
M. J. Graham, C. W. Duncan, and J. R. Kirby.
Water Pollution Control Federation Highlights, Vol. 13, No. 9, p D2-5, September, 1976. 1 fig, 1 tab.

Descriptors: *Infiltration, *Inflow, *Kansas, *Treatment facilities, *Sewers, Flow rates, Infiltration rates, Cities, *Waste water treatment.
Identifiers: *Infiltration/inflow.

The requirement of PL 92-500 that applicants for federal funds for new treatment works or system improvements must determine any excessive infiltration/inflow, has produced guidelines for such a study. There should be a preliminary infiltration/inflow study and, if an excess is found, a sewer system evaluation survey is required to determine the location, extent, and flow rate of the infiltration/inflow. A summary of several studies conducted for Kansas municipalities is reported. The analyses indicated that sewer cross-connections, broken pipes, defective joints, ill-fitting manhole lids, and manholes located in low areas with lids having holes in them that serve as area drains are probable sources. House service lines, approximately 50% of a sewer system, provide numerous potential infiltration/inflow sources. Several suggestions for improving the situation include plugging sewer lines for razed and/or abandoned buildings, requiring new service from existing sewers to new structures or major remodeling of structures in older areas, replacing broken pipes and sewer lines, and repairing leaking manholes. Increasing pipe diameter by 30% produces an 80% flow increase with little additional costs and may be a useful alternative. This investigation concludes that a substantial part of infiltration/inflow is not readily identifiable or easily corrected and providing holding facilities and treating excessive flow at treatment facilities is more cost effective, generally. It was also noted that the flows on which the studies were based were not reliable and that correction of the situation should be a part of the continuing municipal budget. (Collins-FIRL)
W77-03479

GRANT AID FOR PLANT OPERATIONS: A EVALUATION,
New York State Dept. of Environmental Conse vation, Albany. Environmental Quality Researc and Development Unit.
L. J. Hetling, I. G. Caracich, P. J. Mack, and J. C. Klimek.
Journal Water Pollution Control Federation, Vo 48, No. 11, p 2529-2540, November, 1976. 2 fig, tab, 1 ref.

Descriptors: *Waste water treatment, *Sewa treatment, *Sewage treatment, *Sewera *Treatment facilities, *Grants, New York, Sta governments, Operations, Operation and mai tenance, Construction.

A New York State Legislature study on its pr gram of financial assistance in the constructio operation, and maintenance of waste water tre ment plants was reported. The main goal of t program was to prevent deterioration of new tre ment plants and to upgrade existing ones whe feasible. In evaluating administrative costs, it w found that the program cost $720 thousand a nually or $1 in administrative overhead for ea $25 given in grant. Rising expenditures were co sidered the result of an increase in eligible fac ties, the greater costs of more efficient and co plex plants, and general economic inflation. Ma rejections under the program were due removals less than design or deteriorati removals; lack of action on study and/or c rection of flow measurements, hydrologic ov loading, infiltration or storm water problems; n waste water discharges or bypassing; and adequate or no sampling and/or laboratory testi The program was very helpful in improving sec dary considerations such as plant performance, creasing inspection and repair operations, ma taining qualified personnel without politi overstaffing, inspiring community sewer use dinances, improving safety standards, and aid compliance with pollution abatement orde There are problems with this system which hi hindered full participation by New York commu ties. Some were complicated by community disl of outside inspections and supervision. Oth were financial. In some cases the possible st funds would not be of sufficient benefit in impr ing treatment facilities and, often, costs involv in application for grants were detrimental inh tors. (Collins-FIRL)
W77-03483

COLORADO WATER QUALITY CONTR ACT.
For primary bibliographic entry see Field 6E.
W77-03490

INDIVIDUAL SEWAGE DISPOSAL SYST ACT.
For primary bibliographic entry see Field 6E.
W77-03491

WATER POLLUTION.
For primary bibliographic entry see Field 6E.
W77-03495

CARLSON V VILLAGE OF WOR (PREEMPTION OF LOCAL REGULATION SANITARY LANDFILL BY ENVIRONMENT PROTECTION ACT).
For primary bibliographic entry see Field 6E.
W77-03497

STATE DEPT OF POLLUTION CONTROL V TERNATIONAL PAPER (DETERMINATION OF FISH VALUE TH WERE KILLED BY POLLUTANTS).
For primary bibliographic entry see Field 6E.
W77-03498

ISONING OF, AND OBSTRUCTION TO, H.
primary bibliographic entry see Field 6E.
7-03500

RIGATION AND WATER RIGHTS.
primary bibliographic entry see Field 6E.
7-03502

ATER, LIGHTING AND SEWERS.
primary bibliographic entry see Field 6E.
7-03506

BLIC INLAND LAKE PROTECTION AND HABILITATION.
primary bibliographic entry see Field 6E.
7-03510

LLAGE OF LOMBARD V STATE POLLUON CONTROL BOARD (POLLUTION CONOL BOARD WITHOUT AUTHORITY TO IMSE REGIONALIZATION UPON LOCAL VERNMENTAL BODIES).
primary bibliographic entry see Field 6E.
7-03511

MMONWEALTH V. BARNES AND TUCKER MPANY (PUBLIC NUISANCE OF ACID NE DRAINAGE).
primary bibliographic entry see Field 6E.
7-03519

INT FORMULATING POINT SOURCE TEGORY EFFLUENT GUIDELINES AND ANDARDS.
vironmental Protection Agency, Washington, C.
deral Register, Vol 40, No 145, p 31724-26, July 1975. 3 p.

scriptors: *Paints, *Waste water treatment, andards, *Water pollution sources, Adminisive agencies, Regulation, Solvents, Incinera, Navigable waters, Recycling, Costs, nomic impact, Federal government, Water lity, Treatment facilities, Water pollution treatnt, Water quality control, Water quality stands, Pollutants, Effluents, Federal Water Pollu Control Act, Industries.
ntifiers: *Administrative regulations(EPA), WPCA Amendments of 1972.

e Environmental Protection Agency (EPA) is ablishing final effluent limitations and delines for existing sources and standards of formance and pretreatment standards for new rces in the oil-base solvent wash paint subegory of the paint formulating point source egory. For this subcategory, no discharge of cess waste water pollutants is allowed either to igable waters or to publicly owned treatment rks since discharge of these pollutants would e a substantial damaging impact on water quali. The EPA notes that currently most plants are discharging process waste water pollutants. ernate treatment methods include solvent overy and incineration. Members of the paint ustry have commented that existing methods not necessarily the equivalent of no discharge ce discharge to a landfill or a municipal treatnt system is a discharge. The EPA further es that recycling was systems reduce the ume of process waste water but do not npletely eliminate it. (Capehart-Florida)
7-03526

RGINIA STATE PROGRAM FOR CONTROL DISCHARGE OF POLLUTANTS TO VIGABLE WATERS; APPROVAL.
vironmental Protection Agency, Washington, C.
Federal Register, Vol 40, No 9, p 20129-30, May 8, 1975. 2 p.

Descriptors: *Federal Water Pollution Control Act, *Virginia, *Permits, *Water pollution control, Pollutants, Pollutant identification, Water pollution, Water pollution sources, Programs, Federal government, State governments, Legal aspects, Administrative agencies, Regulation, Control, Water pollution effects, Bodies of water, Licenses.
Identifiers: *National Pollutant Discharge Elimination System.

The Environmental Protection Agency has granted the State of Virginia's request for approval of its program for controlling discharges of pollutants to navigable waters in accordance with the National Pollutant Discharge Elimination System (NPDES), pursuant to section 402(b) of the Federal Water Pollution Control Act. Section 402 of the Act establishes a system whereby permit may be issued for discharge of certain pollutants, and section 402(b) allows any state desiring to administer its own permit program for discharges into navigable waters within its jurisdiction to submit such a program to the Administrator for approval. The Virginia NPDES permit program is being administered by the Virginia State Water Control Board. (Hadoulis-Florida)
W77-03527

ORGANIC CHEMICALS MANUFACTURING POINT SOURCE CATEGORY-EFFLUENT LIMITATIONS AND GUIDELINES (AMENDMENTS TO REGULATIONS-BUTADIENE).
Environmental Protection Agency, Washington, D. C.
Federal Register, Vol 40, No 233, p 56435-36, December 3, 1975. 2 p.

Descriptors: *Federal Water Pollution Control Act, *Chemical industry, *Chemical wastes, *Waste water treatment, *Standards, Regulation, Industries, Chemicals, Water pollution sources, Effluents, Pollutants, Water pollution, Water quality, Water quality control, Water quality standards, Administrative agencies, Federal government, Biochemical oxygen demand.
Identifiers: *Administrative regulations(EPA).

The Environmental Protection Agency is amending the regulation relating to effluent limitations and guidelines for the discharge of water pollutants generated by any manufacturing process using oxidative-dehydrogenation of n-butene or butylene. The effluent characteristics for which limitations are established are BOD5, TSS and pH. These guidelines represent the degree of effluent reduction which can be attained by applying the best practicable control technology available at the present time. (Capehart-Florida)
W77-03528

PROPOSED TOXIC POLLUTANT EFFLUENT STANDARDS.
Environmental Protection Agency, Washington, D. C.
Federal Register, Vol 41, No 113, p 23576-96 June 10, 1976. 21 p.

Descriptors: *Federal Water Pollution Control Act, *Pesticides, *Industrial wastes, *Effluents, *Standards, Regulation, Pollutants, Toxicity, Administrative agencies, Federal government, Water pollution, Water quality, Water quality standards, Aldrin, Dieldrin, DDD, DDE, DDT, Endrin, Pesticide toxicity, Public health, Persistence, Waste treatment, Waste water treatment, Water quality control.
Identifiers: *Administrative regulations(EPA), Carcinogens, Toxaphene.

The Environmental Protection Agency has proposed effluent standrads for manufacturers and formulators, both existing and new sources, for the following toxic pollutants: aldrin, dieldrin, DDT, DDD, DDE, endrin, and toxaphene. These substances are among the most highly toxic pesticides known, are persistent in the environment, are lethal to wildlife in low doses, bioaccumulate in aquatic organisms, and pose a threat of cancer to man. The proposed standards allow no aldrin, dieldrin, DDT, DDE, or DDD in any discharge. Permitted levels are established for endrin and toxaphene. Where a toxic pollutant is present in the intake water, an operator will not be required to remove it with the waste water treatment system. (Capehart-Florida)
W77-03529

SECONDARY TREATMENT INFORMATION; BIOCHEMICAL OXYGEN DEMAND, SUSPENDED SOLIDS AND PH.
Environmental Protection Agency, Washington, D. C.
Federal Register, Vol 41, No 144, p 30786-88, July 26, 1976. 4 p.

Descriptors: *Water quality standards, *Regulation, *Water chemistry, *Biochemical oxygen demand, *Coliforms, Water quality, Standards, Water pollution, Water policy, Suspended solids, Administrative agencies, Governments, Disinfection, Legislation, Treatment, Treatment facilities, Waste water(Pollution), Federal Water Pollution Control Act.
Identifiers: *FWPCA Amendments of 1972, pH limitations, Secondary treatment.

The Environmental Protection Agency has proposed an amendment to the Secondary Treatment Information regulation contained in 40CFR Part 133 pursuant to sections 301 and 304 of the Federal Water Pollution Control Act Amendments of 1972. The proposed amendment deleted a section dealing with the limitations for fecal coliform bacteria and added 'special consideration' for clarification of pH limitations. The majority of comments received on the proposed rule changes indicated support for the proposed amendment. The proposed amendment for the deletion of fecal coliform limitations specified reliance on state water quality standards for establishing minimum disinfection requirements for publicly owned treatment works. A significant majority of the responding state agencies, responsible for setting and implementing water quality standards, supported the deletion. The amended version of Part 133 of Chapter I of Title 40 of the Code of Federal Regulations is set forth in the article. (Rieck-Florida)
W77-03530

MARINE SANITATION DEVICE STANDARD.
Environmental Protection Agency, Washington, D. C.
Federal Register, Vol 41, No 20, p 4452-4, Jan 29, 1976, 3 p, 1 tab.

Descriptors: *Ships, *Sewage, *Water pollution, *Standards, *Environmental sanitation, Waste treatment, Boats, Water quality control, Great Lakes, Locks, Freshwater, Estuaries, Coasts, Effluents, Navigable waters, Non-navigable waters, Coliforms, Reservoirs, State jurisdiction, Federal government, Administrative agencies, Bodies of water, Lakes.
Identifiers: *Administrative regulations(EPA), *FWPCA Amendments of 1972.

As required by the 1972 Amendments to the Federal Water Pollution Control Act, the Environmental Protection Agency has established federal standards of performance for vessels on which marine sanitation devices have been installed. Comments from interested parties are included, as well as a table summarizing the federal marine sanitation device standards. The standard for freshwater lakes and non-navigable rivers requires that the marine sanitation devices must prevent

overboard discharge of sewage or sewaged waste. In other waters the standard allows discharge but limits the fecal coliform bacterial count. A state may completely prohibit discharge of sewage into waters within the state by all vessels by making application to the Environmental Protection Agency. The requirements for approval of such as application are detailed. (Capehart-Florida)
W77-03531

UNIONS FIGHT A JONES ACT WAIVER.
For primary bibliographic entry see Field 6E.
W77-03532

THE HARD JOB OF SAVING LAKE ERIE.
Business Week, No. 2404, p 116, October 27, 1975. 1 p, 1 photo.

Descriptors: *Agricultural runoff, *Lake Erie, *Water pollution control, *Phosphorus, *Algae, Bodies of water, Great Lakes, Lakes, Surface waters, Aquatic environment, Aquatic microbiology, Water pollution effects, Water pollution sources, Water pollution treatment, Water quality.
Identifiers: *FWPCA Amendments of 1972.

Lake Erie is a dying lake. The primary cause is the introduction of phosphorus from industrial and municipal sewage discharges and from agricultural runoff. Phosphorus stimulates the growth of algae, which die and decompose in late summer. The decomposition consumes all the dissolved oxygen in the lake's cool lower stratum. This condition, known as anoxia, lasts until the entire lake cools in autumn. The anoxia, in turn, causes a reaction that pumps up more phosphorus from the bottom sediments, which stimulates the growth of more algae. The lake is choking on its own regenerated pollution. Studies have been done in conjunction with the Water Pollution Control Act amendments of 1972 showing that costs to implement the required 'best available technology' will run over two billion dollars. While slow improvement is forecast, the future is not bright for a lake that has aged 15,000 years in the last 200. (Frank-Florida)
W77-03534

FEASIBILITY OF TRANSPLANTATION, REVEGETATION, AND RESTORATION OF EELGRASS IN SAN DIEGO BAY, CALIFORNIA,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Environmental Effects Lab.
C. G. Boone, and R. E. Hoeppel.
Available from the National Technical Information Service, Springfield, VA 22161 as AD/A021 484, Price codes: A03 in paper copy, A01 in microfiche. Miscellaneous Paper Y-76-2, February 1976. 47 p. 3 fig., 1 tab., 44 ref., 2 append. DACW09-75-B-0026.

Descriptors: *Marine plants, *Revegetation, Environmental effects, Feasibility, Costs, Shores, *California, Plant growth, Spoil banks, Bays, Methodology.
Identifiers: *Eelgrass, *San Diego Bay(Calif), Zostera marina, Dredge spoil disposal, Transplantation.

The state of the art of eelgrass (Zostera marina L.) revegetation methodologies were evaluated in order to examine the possibility of preserving or replacing the eight-acre Delta Beach eelgrass bed programmed to become a dredged material disposal site. Feasibility of various transplantation and revegetation methods were considered along with site selection criteria, substrate-nutrient effects, temperature, light, and salinity effects, and eelgrass productivity and nutrient recycling. It is suggested that the eelgrass turions be harvested during the winter months prior to filling the dredge disposal site and broadcast into other areas of south San Diego Bay where patchy eelgrass beds already exist. Replanting of the Delta Beach areas should be postponed for a minimum of a year after filling, to allow the substrate to become stabilized and consolidated. The plug method, an alternative approach to the turion method of transplantation, would likely be more productive, but being more labor-intensive would also be more costly. A comparison of the respective costs of these two methods is appended. It is also recommended that a pilot study be undertaken to more accurately determine the most cost effective and productive procedures. (Luedtke-Wisconsin)
W77-03546

CALIFORNIA'S GROUND WATER.
California State Dept. of Water Resources, Sacramento. Div. of Planning.
For primary bibliographic entry see Field 4B.
W77-03548

GROUND WATER BASIN PROTECTION PROJECTS: FREMONT SALINITY BARRIER.
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 4B.
W77-03555

A MODEL FOR THE CONTROL OF DISSOLVED MANGANESE IN THE INTERSTITIAL WATERS OF CHESAPEAKE BAY,
Johns Hopkins Univ., Baltimore, Md. Dept. of Earth and Planetary Sciences.
For primary bibliographic entry see Field 5B.
W77-03556

INVESTIGATION OF THE PHYSICAL FEASIBILITY OF MOBILE FISH PROCESSING PLANTS,
Fisheries and Marine Service, Ottawa (Ontario). Research and Development Directorate.
For primary bibliographic entry see Field 6B.
W77-03558

DETERMINATION OF MAXIMUM PERMISSIBLE LEVELS OF SELECTED CHEMICALS THAT EXERT TOXIC EFFECTS ON PLANTS OF ECONOMIC IMPORTANCE IN ILLINOIS,
Southern Illinois Univ., Carbondale.
For primary bibliographic entry see Field 5A.
W77-03565

THE COST OF PRODUCING EFFLUENTS TO VARYING STANDARDS BY BIOLOGICAL TREATMENT TECHNIQUES,
For primary bibliographic entry see Field 5D.
W77-03568

THE MUDDY ROAD TO CLEAN WATER,
M. Green, and S. Flander.
American Forests, Vol 80, p 24-27, 56-59 (June 1974). 7 p, 8 photo.

Descriptors: *Federal Water Pollution Control Act, *Water Quality Act, *Legislation, *Water pollution control, *Project post-evaluation, Projects, Project planning, Project benefits, Programs, Water quality control, Water quality standards, Water quality, Water pollution treatment, Water policy, Water pollution, Administrative agencies, Project purposes.
Identifiers: *FWPCA Amendments of 1972, *Administrative regulations, *Congressional hearings.

Federal effort to achieve clean water culminated in the Federal Water Pollution Control Act Amendments of 1972. These amendments were thought to be the most comprehensive ever, capable of restoring and maintaining the chemical, physical and biological integrity of the nation's waters. After seemingly endless optimism, the judgment is that, so far, the program has yet to get off the ground. Major criticism has been aimed at the principal administrator of the program, the E vironmental Protection Agency (EPA). Specif charges have been levied that guidelines promu gated by EPA are too complex and too far behi schedule, paperwork required is too extensive a that promised funding has not been forthcomin Only half of the desired money for sewage trea ment construction grants has been released a then only after numerous court battles. The e fluent guidelines have not been promulgated schedule and toxic pollutant standards have be virtually nonexistent. EPA has responded that t complexity of the program and the short time which they were given to carry it out h prevented smooth implementation of program po icies. (Welch-Florida)
W77-03587

IMPLEMENTING THE NATIONAL WATE POLLUTION CONTROL PERMIT PROGRA PROGRESS AND PROBLEMS.
Comptroller General Report to Subcommittee Investigations and Review House Committee Public Works and Transportation, p 1-85, Febru ry 1976. 85 p, 4 append.

Descriptors: *Water permits, *Water pollut control, *Effluents, *Water quality standar *Industrial wastes, Financial feasibility, Monit ing, Permits, Water policy, Water pollution, Wa quality, Water quality control, Water contr Regulations, Pollution abatement, Pollutants, J dicial decisions Municipal wastes.
Identifiers: *Point sources(Pollution), *Natio Pollutant Discharge Elimination System(NPDES

Examined here are the problems affecting the N tional Pollutant Discharge Elimination Syst (NPDES) permit program. The program, which administered by the Environmental Protecti Agency, is intended to clean up the nation's wat ways through issuance and enforcement of p mits which define allowable effluent limitatio Legislation requires that compliance with the limits be met by July 1, 1977. However, t deadline may be unrealistic in light of three ma problems confronting the program. First, a U. district court has ruled that the Environmen Protection Agency (EPA) must issue permits to major and minor point source polluters. Becau the Government Accounting Office believes t compliance with this ruling would present an most impossible task it suggests new legislat giving the EPA the power to exempt minimum fect polluters. The second factor affecting tim implementation of the program is that many ind trial law suits have been brought challenging reasonableness of the permit requiremen Thirdly, the report states that insufficient fede funding has prevented many municipalities fr constructing or upgrading their discharge faciliti Further, since neither the EPA nor the states p to take enforcement actions against the m nicipalities, it is recommended that the deadl for municipal compliance be extended on a ca by-case basis. (Josepher-Florida)
W77-03588

ENVIRONMENTAL CONCERN AS A FACT IN COASTAL ZONE DEVELOPMENT: STUDY OF LOUISIANA CITIZENS,
Louisiana State Univ., Baton Rouge. Dept. Rural Sociology Research.
For primary bibliographic entry see Field 6G.
W77-03590

THE PEOPLE'S LAKE,
Save Lake Superior Association, Duluth, Minn.
K. T. Carlson.
Environment, Vol 17, No 2, p. 16-20, 25-26, Ma 1975, 7 p, 4 photo, 19 ref.

Descriptors: *Asbestos, *Industrial wastes, *L Superior, *Judicial decisions, *Minnesota, Wa pollution sources, Great Lakes, Lakes, Surf

ers, Aquatic environment, Water pollution ef-
s, Water pollution treatment, Water quality,
inistrative agencies, Inorganic compounds.
ntifiers: *Injunctive relief.

erve Mining Company of Silver Bay, Min-
ota has been dumping 750 million gallons of
tewater, 67,000 tons of taconite waste, and
00 pounds of dissolved solids into Lake Su-
or each day. When the company was granted
ermit in 1947, it was forbidden to do much of
t it is doing today. The Save Lake Superior As-
ation (SLSA) took the company to court, and
974 a District Court judge ruled that Reserve
uld be enjoined from continuing discharge. The
that carcinogenic asbestos fibers were found
e waste played a large part in the decision. The
judge's injunction was stayed by an appellate
rt, however, and on appeal the United States
reme Court refused to overturn the stay. In-
d, it urged that administrative solutions be
ght. Unfortunately, this will prove a lengthy
ess due to Reserve's intransigence. Presently,
vampy area downlake is being studied as a
ntial land site for dumping. Obviously, some
rnative to outright lake dumping must be
nd. The question raised here is whether
eral, state and corporate authorities regard the
blem as one requiring immediate solution.
nk-Florida)
7-03594

OSE NASTY PHOSPHATIC CLAY PONDS,
ironmental Science and Technology, Vol 8,
4, p 312-13, April 1974. 2 p, 1 chart.

criptors: *Florida, *Phosphates,
osphorous compounds, *Chemical wastes,
ms, Dewatering, Filters, Filtration, Fluid fric-
, Fluid mechanics, Waste disposal, Ponds,
te treatment, Waste storage, Waste dumps,
strial wastes.
ntifiers: Clay ponds.

sphatic clay ponds in Florida pose a serious
at to the environment. Held behind earth
s, they always have the potential to escape
heavily pollute any nearby waterways.
ause of the damage that has been caused by
nt dam failures, such as the Fort Meade Mine
971, the phosphate industry has investigated
r methods of containing and removing such
sphatic wastes. Three major methods are ex-
ed: dewatering techniques, filtration, and
s-flow fluid bed dryers. While several de-
ering techniques are technically feasible, such
reezing and solar evaporation, they have not
en economically feasible. Two methods, how-
, appear to be technically and economically
ible: straight mixing with tailings sand; and
nical flocculation together with coagulation
tailings sand. Both methods are currently un-
going field testing. Field testing is also planned
a new filtering system. In the past, filtering
ems were plagued by clogging or blinding of
filter media. The University of Florida has ap-
ntly developed a new system that avoids these
blems. Another new development concerns the
dryer, which can dry slimes of 30% solids to a
der of 95-99% solids content with 75% fuel ef-
ncy. The major problem with this method is in
atering slimes to 30%. Hopefully, one of these
hods will obviate the need for environmentally
fe phosphatic slime ponds. (Frank-Florida)
7-03596

TER RIGHTS,
consin Univ., Madison.
primary bibliographic entry see Field 6E.
7-03599

**WYOMING WATER QUALITY ACT AND
FEDERAL WATER POLLUTION CON-
L ACT AMENDMENTS OF 1972: A COM-
ISON,**
. Orf.

Land and Water Law Review Vol 9, p 79-95 (1974). 17 p, 95 ref.

Descriptors: *Water quality act, *Water pollution sources, *Permits, *Wyoming, *Governmental interrelations, Penalties(Legal), Discharge(Water), Regulation, Water quality standards, State governments, Administrative agencies, Sewage treatment, Federal water pollution control act, Effluents, Interagency cooperation.
Identifiers: *FWPCA Amendments of 1972.

The 1972 Amendments to the Federal Water Pollution Control Act authorized states to administer their own conforming permit programs. This article covers Wyoming's legislation directed toward that program, examines the compliance of the Wyoming act with federal requirements and predicts what further administrative regulation will be necessary to meet federal standards. Both the state and national acts set up a permit system for water pollution sources, with general limitations on the release of effluents. Also examined are the procedural process for permit application and how specific limitation standards can be developed. Required federal regulation which have been adopted by the state include provisions for public participation in the permit process, procedures for hearings, and the release of application information. The state acts compliance with federal regulations for terms and conditions of permits and of variance concessions will need administrative augmentation. The state is given authority to monitor pollution sources; enforcement provisions are included.
W77-03600

6. WATER RESOURCES PLANNING

DEVELOPMENT OF HARDWARE AND PROCEDURES FOR IN-SITU MEASUREMENT OF CREEP IN SEA ICE,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 2C.
W77-03276

6A. Techniques Of Planning

USER ORIENTED SYSTEMS ANALYSIS FOR REGIONAL MUNICIPAL WATER SUPPLY PLANNING,
Utah State Univ., Logan. Coll. of Engineering.
P. E. Pugner, and T. C. Hughes.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 243, Price codes: A06 in paper copy, A01 in microfiche. Utah Water Research Laboratory, Publication PRWA23-1, July 1976. 113 p, 2 fig, 1 tab, 23 ref, 9 append. OWRT B-125-UTAH(2). 14-34-0001-6127.

Descriptors: Water supply, Planning, *Systems analysis, Optimization, *Regional analysis, Model studies, *Municipal water, Costs, *Linear programming, *Alternative costs, *Investment, Capital costs, Operating costs, Maintenance costs.
Identifiers: Interactive data, Mixed integer programming.

An interactive data and model generator is developed that is intended to bridge the gap between planning engineers and the mathematical programming systems approach to municipal and regional water supply planning. The optimization objective is to minimize total annual cost of existing and future alternative source-related water supply facilities with respect to capital investment and operation and maintenance costs. A matrix generator is developed which formulates the necessary hydrologic, demographic and stochastic municipal water supply data into the format of a mixed integer linear programming problem for system optimization. The program then calls the integer programming algorithm, solves the optimization problem, and outputs a report in a format and language designed specifically for the problem at hand. All of this is accomplished in interactive mode with the user simply answering questions which are asked by the program.
W77-03159

WATER RESOURCES OF AUSTRALIA AND THE PATTERN OF POPULATION CONCENTRATIONS,
For primary bibliographic entry see Field 6D.
W77-03278

SUPPLEMENT TO DOCUMENTATION OF FINITE-DIFFERENCE MODEL FOR SIMULATION OF THREE-DIMENSIONAL GROUNDWATER FLOW,
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 2F.
W77-03329

USE OF HYBRID COMPUTER MODEL IN RESOURCE PLANNING,
Central and Southern Florida Flood Control District, West Palm Beach.
G. Shih.
In Depth Report, Vol 3, No 2, p 1-12, Feb 1976. 12 p, 11 fig.

Descriptors: *Computer models, *Hybrid computers, *Water resources, *Model studies, *Planning, Simulation analysis, Water supply, Flood protection, Pollution control, Water pollution, Aquifers, Lakes, Structures, Groundwater, Saline water intrusion, Soil contamination, Analog models, Mathematical models, Digital computers, Systems analysis, Drawdown, Droughts.

Water resource planning requires consideration of a number of factors such as water supply, flood protection, pollution control, and environmental protection. Computer modelling is a widely used tool for studying such complex planning systems. The author suggests use of a hybrid computer, a combination of both a digital and an analog computer, as a feasible means for evaluating resource planning alternatives. The convenient and flexible input-output features and the data manipulation capability of the digital computer are complemented by the continuous solution capability of the analog computer. Analog groundwater simulation models have been used for analysis of draw downs, droughts, and developments of regional impact. A hybrid model has been used to simulate problems of salt water intrusion. Water resource problems which may be appropriate for hybrid modelling are surface water systems, soil and water pollution interactions, and ecological systems. (Capehart-Florida)
W77-03523

USEFUL MODELING CONCEPTS FOR THE FCD WATER SYSTEM,
Central and Southern Florida Flood Control District, West Palm Beach.
A. N. Shahane, and R. L. Hamrick.
In Depth Report, Vol 2, No 4, p 1-12, Sept-Oct 1974. 12 p, 3 fig, 2 tab.

Descriptors: *Simulation analysis, *Analytical techniques, *Hydrologic systems, *Water allocation(Policy), Systems analysis, Linear programming, Water sources, Computers, Water levels, Non-structural alternatives, Computer models, Flood control, Flood routing, Drainage systems, Water management(Applied), River basin development, Artificial water courses, Water resources development, Aquifers, Rainfall simulators, Statistical models.

The water system included in the flood control district is a modified, controlled system rather than a natural system. Therefore, it is not possible to

apply the techniques of conventional engineering analysis of natural streamflows to the system. Examples of the types of modeling concepts which are applied to the system are presented. One such concept involves the coupling of a linear programming water allocation model with a model simulating a specific river basin system. Analysis of operational policies regarding water regulation schedules is achieved by a simulation process which links the models of various water sources and water uses. Another model is a hydrologic model which simulates the effect of rainfall on the streamflows. A routing model which uses output from the hydrologic model provides information on discharges, water levels, and storage at different points in the system. A table is included which shows the present status of modeling activity in the flood control district. Fourteen models are tabulated with their type, field, and area of application. (Capehart-Florida)
W77-03524

6B. Evaluation Process

LOCAL WATER SYSTEMS ARE FREQUENTLY NEGLECTED,
Illinois Univ. at Urbana-Champaign. Dept. of Agricultural Economics.
J. C. Van Es, and R. J. Quigley.
Small Town, Vol 7, No 2, August 1976, p 4-6. OWRT A-075-ILL(3), 14-31-0001-5013.

Descriptors: *Management, *Decision making, *Municipal water, Potable water, *Illinois, *Planning.
Identifiers: *Local planning.

On the basis of detailed questionnaires on municipal public drinking water systems given to 228 incorporated Illinois communities, the investigators concluded, among other things, (1) that the lines of communication among those responsible for water systems operations are frequently poor, (2) that financial information on a system's operation is often missing or unknown by those who set the rates, (3) that many municipalities (45%) do not engage in formal planning, and (4) that many systems (27%) have no procedures for such common emergencies as low water pressure. The investigators warn that unless local communities begin to take the initiative and eliminate these problems, unwanted federal and state intervention will become more and more necessary.
W77-03121

AN APPRAISAL OF CONFLICTING INSTITUTIONAL ATTITUDES ON THE WESTWIDE STUDY REPORT.
Idaho Univ., Moscow. Water Resources Research Inst.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 346, Price codes: A06 in paper copy, A01 in microfiche. Proc. Paper No 308, June 1976, 108 p. Proc. of a Joint Water Resources Seminar of the Univ. of Idaho and Washington State Univ. (2nd Semester, 1975-1976). J.S. Gladwell, C.C. Warnick, W.H. Funk, J.R. Davidson, D.L. Bassett (eds.). OWRT A-999-IDA(8).

Descriptors: *Institutional conflicts, *Attitudes, *Conferences, Institutions, Water resources development, *Evaluation, Reviews, Research priorities.
Identifiers: *Westwide Study report, *Wester US(Water problems), *Critical water problems(Western US).

'Critical Water Problems Facing the Eleven Western States' was the subject of this seminar. It is also the title of a final report authorized under PL 90-537 of 1968, sponsored by the U.S. Bureau of Reclamation, and otherwise known as the Westwide Study. (See W76-00716 and W76-00717) As had the USBR study, the seminar addressed contemporary water problems of the West, its format providing a broad pivotal base for speakers of varying state, local, regional or federal perspectives. (Gladwell-Idaho)
W77-03157

USER ORIENTED SYSTEMS ANALYSIS FOR REGIONAL MUNICIPAL WATER SUPPLY PLANNING,
Utah State Univ., Logan. Coll. of Engineering.
For primary bibliographic entry see Field 6A.
W77-03159

ELECTRIC POWER DEVELOPMENT IN THE PACIFIC NORTHWEST REGION: INSTITUTIONAL COMMITMENTS AND ALTERNATIVES, PHASE I,
Washington Univ., Seattle. Inst. for Environmental Studies.
For primary bibliographic entry see Field 6I.
W77-03288

USE OF HYBRID COMPUTER MODEL IN RESOURCE PLANNING,
Central and Southern Florida Flood Control District, West Palm Beach.
For primary bibliographic entry see Field 6A.
W77-03523

WATER MANAGEMENT AND REGULATION OF WATER USE,
Central and Southern Florida Flood Control District, West Palm Beach.
A. Kreitman.
In Depth Report, Vol 3, No 1, p 1-12, April 1975. 12 p. 5 fig, 2 tab.

Descriptors: *Florida, *Hydrologic budget, *Water allocation(Policy), *Water permits, *Groundwater resources, Water management(Applied), Consumptive use, Water districts, Evapotranspiration, Rainfall, Recharge, Potable water, Irrigation, Planning, Saline water intrusion, Water requirements, Water supply, Water conservation, Water utilization, Aquifers, Water sources.

The regulation of consumptive water use is one of the factors involved in water management. The flood control district of south Florida is engaged in formulating a plan to provide water resources to the many competing uses in a consistent manner A water budget has been designed which establishes the long term sustained yield of the water basin. This safe yield is defined as the average annual recharge to the ground water system which is equivalent to the annual rainfall minus the annual evapotranspiration. Several examples of application of the water budget principle are given. One involves a request for an agricultural water use permit. The technique demonstrates that the amount of water requested substantially exceeded the amount actually needed. Therefore, a much smaller amount was permitted. Other studies relate to requests from municipalities for increases to the water supply systems. The possibility of salt water intrusion in the well field caused by additional wells was analyzed and it was recommended that different locations be used for the wells. (Capehart-Florida)
W77-03525

PROJECTIONS OF POPULATION, EMPLOYMENT, INCOME AND WATER USE FOR IOWA RIVER BASINS, 1975-2020,
Iowa Univ., Iowa City. Inst. of Economic Research.
For primary bibliographic entry see Field 6D.
W77-03542

THE LEGAL FRAMEWORK FOR PUBLIC PA TICIPATION IN CANADIAN WATE MANAGEMENT,
Canada Centre for Inland Waters, Burlingt (Ontario).
For primary bibliographic entry see Field 6E.
W77-03543

THE OBJECTIVES, PART I OF THE STA WATER PLAN, (IDAHO WATER RESOURC BOARD).
Idaho Water Resource Board, Boise.
June 1974. 49 p. 5 fig., 2 tab.

Descriptors: *Idaho, *Comprehensive planni *Water management(Applied), *State gove ments, Rocky Mountain region, Planning, Lo term planning, Water resources developme River basin development, Multiple-purpose p jects, Social aspects, Legal aspects.
Identifiers: Snake River(Idaho).

An initial report identifies and defines the polic and objectives which the Idaho Water Resou Board has adopted to govern the planni development and conservation of the state's wa and related land resources. This report of obj tives will constitute, along with subsequent dividual reports covering projects and progra necessary for the state's three main river ba areas, the Idaho State Water Plan. Described this report are interfaces among the state's natu resources as they relate to water use. These clude land, water, geothermal water, miner timber, fish and wildlife. Other resource fact discussed are population, the economy, empl ment and personal income. Thirteen statement objectives are delineated in the report, with e describing a facet of water planning philoso that is intended to become mandatory for fut governmental and private activities in the s which impact on water resources. Objective ar are: beneficial and efficient water use, elec energy, environmental quality, erosion and s mentation control, fish and wildlife, aquacultu flood damage reduction, agriculture, Indian la and related water resources, interbasin w transfer, recreation, state-federal rights, and w and scenic rivers. (Harris-Wisconsin)
W77-03544

WATER FOR NEVADA. WATER PLANNI REPORT.
Nevada Div. of Water Resources, Carson C Office of State Engineer..
Special Summary Report, November 1974. 24 p

Descriptors: *Nevada, *Comprehensive planni *Water management(Applied), *State gov ments, *Reclamation states, Southwest U Planning, Long-term planning, Water resou development, River basin development, Multi purpose projects, Social aspects, Legal aspects
Identifiers: *Nevada State Water Plan.

Description is given of the information contai in detailed reports and supporting material wh constitutes the state's comprehensive water p The legislative background and plan procedures of the overall effort are descri along with summaries of each of 16 'Water Nevada' reports issued since January 1971, an ports of 'Alternative Plans for Water Use' co ing six river basin areas into which the state is vided for water resource planning purpo General findings, conclusions and recomme tions are covered, along with separate conclus and recommendations for the individual r basin areas. Conclusions and recommendation projected water requirements are given for nicipal and industrial water use, electric en generation, mining, recreation, agriculture, and wildlife. The general conclusions and rec mendations cover water law and administra procedures, funding of water resource proje local options and discretion, mining or depletio

d water, transbasin diversions, preferred
reservation of water quantities, termed ap-
l of water appropriations, water supplies and
for temporary construction uses, wells for
stic use, taxes on well production, geother-
resources, subdivision water supplies,
federal jurisdiction, flood control, navigabili-
nvironmental considerations and continuing
ing efforts. (Harris-Wisconsin)
03545

A'S WATER RESOURCES PROGRAM GRESS AND NEEDS.
Natural Resources Council, Des Moines.
al Report 1973. 28 p. 15 fig., 1 tab.

iptors: *Iowa, *Planning, *Comprehensive
ing, *Water resources development, Missis-
River Basin, Missouri River, Interstate
, State governments, State jurisdiction,
basin development, Water manage-
Applied), Institutions, Local governments,
tructural alternatives, Water law, Water pol-

fiers: Upper Mississippi River Basin, Mis-
River Basin.

neral program overview is described for
oping a statewide plan for the orderly
opment, use, protection and conservation of
and related resources in Iowa. Included are
ations of facts justifying a comprehensive
plan, and a general description of the state's
ble water resources--including discussions
imatological factors, streamflow, floods,
dwater, geologic and hydrologic considera-
and general water quality characteristics of
tate. Interrelationships are examined for
supply, water quality control, agricultural
production, flood plain occupancy and
gement, water-oriented recreation, fish and
e resources, navigation and energy produc-
Historical aspects of water policy develop-
in Iowa are summarized, and the state's in-
e with Missouri and Upper Mississippi in-
te river basins is examined. An organiza-
and institutional flow chart is given in which
ynamics of water and related resources
ng are graphically described. Findings and
mendations are listed for studies of existing
water policies and laws, public participation
s, urban versus rural water supply needs,
water treatment, watershed problem identifi-
and ranking, and program funding on multi-
mental levels. (Harris-Wisconsin)
03547

N WATER USE IN CALIFORNIA.
rnia State Dept. of Water Resources, Sacra-
.
in No. 166-2, October 1975. 178 p, 5 fig, 6

ptors: *California, *Water utilization,
, Surveys, Data collections, Prices,
ng, Urbanization, *City planning.

ly water use data for 147 water service
es throughout California for the period
en 1961 and 1970 is presented. Analysis of
ta indicates that, in 1970, California urban
nts and manufacturing industries together
n average of 4.3 billion gallons of fresh
per day or about 13% of the total freshwater
ariations in unit water use among the 11
ogic study areas along with the magnitude
-supplied water use in some areas are illus-
Unit use is exceptionally high in the North
l and North Lahontan areas due to a small
tion base and high industrial water use. An-
ater use by county is illustrated as are coun-
nthly and annual unit water use for 1966
h 1970, except for industry-produced water
was ascertained only on an annual basis. A
ry of annual per capita water use within in-
l cities and agency boundaries is included,
as well as the average retail price range for water in 1970. The basic records of monthly unit water use for 1960 through 1970, which provide the main statistical array of data to use in making peak monthly demand projections is also included. Most of this data is graphic or in statistical form. (Luedtke-Wisconsin)
W77-03549

PLAN FOR IMPROVEMENT OF THE DELTA LEVEES.
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 4A.
W77-03550

THE CALIFORNIA STATE WATER PROJECT IN 1975.
California State Dept. of Water Resources, Sacramento.
Bulletin No. 132-75, June 1975. 192 p, 17 fig, 12 tab, append.

Descriptors: *Facilities, Hydraulic structures, *Water management(Applied), *Water resources development, *Water distribution(Applied), *Multiple-purpose projects, *California, Dams, Impoundments, *Aqueducts, Water conveyance, Pumping plants, Hydroelectric plants, Powerplants, Long-term planning, Legal aspects, Financing, Recreation, Construction, Administration.
Identifiers: California Aqueduct.

The progress to 1975, current status and future plans of California's Water Project, including the 444-mile aqueduct, are summarized and reviewed, with specific reference made to construction of dams and reservoirs, power plants, supplemental aqueducts and pumping stations. Information is provided concerning the history of the project, project construction, project utility management, operations, visitor use, recreation/fish/wildlife use and project financing. Seventy-six percent of the project facilities scheduled for completion by the end of 1985 were under construction or completed by the beginning of 1975. These facilities include 23 dams and reservoirs, eight power plants, 22 pumping stations and 684 miles of aqueducts. Detailed information is given for actions concerning project power, water supplies, recreation/fish/wildlife enhancement; litigation; construction plans, specifications, land acquisition, relocations and building progress; management of water rights, water contracts and power contracts; project operations among the various field divisions; construction expenditures and other capital requirements; operating revenues; miscellaneous receipts and capital requirements. (Harris-Wisconsin)
W77-03551

HYDROLOGIC INVENTORY OF THE SAN RAFAEL STUDY UNIT.
Utah Div. of Water Resources, Salt Lake City.
For primary bibliographic entry see Field 4A.
W77-03552

MEETING WATER DEMANDS IN SACRAMENTO COUNTY.
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 6D.
W77-03553

VEGETATIVE WATER USE IN CALIFORNIA, 1974.
California State Dept. of Water Resources, Sacramento. Water Use Programs.
For primary bibliographic entry see Field 3F.
W77-03554

INVESTIGATION OF THE PHYSICAL FEASIBILITY OF MOBILE FISH PROCESSING PLANTS,
Fisheries and Marine Service, Ottawa (Ontario). Research and Development Directorate.
W. L. Dilk.
Technical Report No. 634, 1976. 29 p, 12 fig, 1 append.

Descriptors: *Canneries, Fish handling facilities, *Economic justification, Fish harvest, Commercial fish, Commercial fishing, Food processing industries, Pollutants, Industrial wastes, Facilities, Capital costs, Cost analysis, Estimated costs, Canada, Economies of scale, Waste disposal.
Identifiers: *Mobile facilities, Bio-drum liquid effluent disposable system, Mobile processing units.

A study in Canada to determine the physical feasibility of building mobile fish processing plants indicates that systems made up of three mobile subunits each can be utilized for defleshing, block freezing operations, cold storage, power supply and optional liquid effluent disposal. However, further studies are needed to relate economic feasibility of the units to their 10 year life expectancy, along with analysis of production constraints, capital costs and space limitations inside the units. The mobile fish processing concept is designed as a partial answer to quota systems applied to certain lakes that constrain development of permanent facilities, and as a solution to the problem of underutilized species such as mullet which are harvested on a seasonal basis. Detailed technical data are given for plant specifications such as mechanical and electrical systems, refrigeration, process equipment and product transportation. Logistics and production capabilities are described, and capital costs are compared with capital reduction options made possible by deletion of certain equipment items or by use of partial leasing arrangements. General producation parameters and considerations, along with physical plant capacities, are summarized. (Harris-Wisconsin)
W77-03558

THE STATE OF UTAH WATER - 1975,
Utah Div. of Water Resources, Salt Lake City.
B. C. Saunder.
January 1976. 72 p., 9 fig., 2 tab., 10 ref.

Descriptors: *Utah, *Comprehensive planning, *Decision making, *Water allocation(Policy), Projections, Colorado River Basin, Colorado River, Water demand, Water rights, Competing uses, Electric power production, Cooling water, Irrigation, Industries, Financing, Oil shales, Water resources development, Cloud seeding, Consumptive use, Water supply.
Identifiers: *Utah water plan.

This third general status report on the comprehensive water planning process in Utah addresses the current issues and the water planning process itself. The major water resources planning problem in this water-deficient state is one of economics, that is, projects which are technically and physically feasible are often beyond the means of the potential users to pay the costs. The emphasis is directed toward determining and placing in priority the most pressing water-related needs and taking appropriate action to meet those needs. The major water policy issues facing state planners are goals and objectives, water allocation, and the use of the Colorado River water as related to socio-economic values and environmental concerns. The guiding prinviple of the planning process is directed toward optimum use of water resources by including concepts of multiple use of facilities, sequential water use and reuse. Among the water allocation considerations are the requirements for coal mining, coal-fired power plants, oil shale development, and financing. About 47% of the state has been cloud seeded and it is anticipated that the major mountain watersheds will be seeded within the next few years. Water derived from cloud

seeding is regulated by existing water rights. Cloud seeding is considered an integral part of the state water plan and may be the only method to provide an additional water supply in areas where economic restrictions prohibit physical conveyance systems to be built. (Auen-Wisconsin)
W77-03559

IOWA WATER RESOURCES FRAMEWORK STUDY PLAN OF STUDY.
Iowa Natural Resources Council, Des Moines. Technical Coordinating Committee.
August 1975. 26 p, 3 fig, 4 tab.

Descriptors: *Water management(Applied), *Iowa, *Planning, *Water resources development, Comprehensive planning, State governments, State jurisdiction, River basin development, Institutions, Local governments, Non-structural altern ives, Water law, Water policy, Programs, Methodology, Projections, Scheduling, Budgeting, Social aspects.
Identifiers: Citizen participation, Public information, Problem identification and ranking.

Iowa's comprehensive state water resources plan is outlined, including a statement of goals and objectives, description of the study area, and framework descriptions of the study organization and management, strategies for public participation and information, and initial ideas for the process, scheduling and budget of the plan. The framework study, based on existing data, is the first part of the state's long-range water resources planning process. The study identifies needs, along with existing and potential problems, outlines current and potential demands on the resources, suggests programs and remedial measures and suggests policies from which fundamental philosophy of water resources management and allocation will be derived for use by the appropriate state agencies. Time-table activities under the plan are scheduled from July 1975 through June 1978 for the framework study. Work assignments are made for individual segments of the study work effort: data base and needs, water resources availability, socioeconomic/legal/institutional trends, water use, water quality management, water-oriented fish and wildlife resources, energy production and navigation. (Harris-Wisconsin)
W77-03561

REHABILITATION OF PAMLICO SOUND OYSTER PRODUCING GROUNDS DAMAGED OR DESTROYED BY HURRICANE GINGER,
North Carolina Div. of Marine Fisheries, Raleigh.
F. H. Munden.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-246 966, Price codes: A03 in paper copy, A01 in microfiche. Special Scientific Report No 27, May 1975. 36 p, 19 fig, 3 tab, 7 ref. NMFS 2-173-D.

Descriptors: *Oysters, *North Carolina, Shellfish farming, Hurricanes, Rehabilitation.
Identifiers: *Pamlico Sound(NC), Oyster beds.

The North Carolina Pamlico Sound oyster beds, damaged by Hurricane Ginger in 1971, were rehabilitated to prevent losses to more than 700 fishermen. The focus was to reseed shell stock and/or marl to compensate for the mortality of small oysters and to reestablish base rocks in these traditionally high quality grounds. Oyster rehabilitation began in June 1972 with plantings of 69,000 bushels of fresh oyster shells as cultch and 86,000 bushels of marl, using a formula of 500 to 750 bushels per acre, with the higher planting rates in deeper water. Sampling of spat set after six months indicated good winter survival and normal to excellent growth in the southern Pamlico Sound areas but lower spat sets in the northwest areas. Approximately 24,000 bushels of seed oysters were planted in the less productive areas in 1973, employing local and commercial fishermen. All shell plantings showed successful rehabilitation. Marl spat set was more irregular with lower winter survival than on shell. Seed oysters were procured as additional cultch material and stock from near the entrance to Pamlico River where they seldom grew to legal harvestable size. It was believed that oyster growth there was retarded by the large amount of fresh water runoff. (Auen-Wisconsin)
W77-03562

HURDLES IN THE PATH OF COASTAL PLAN IMPLEMENTATION,
G. Bowden.
S. Cal. L. Rev., Vol. 49, No. 4, p. 759-71 (1976). 13 p.

Descriptors: *California, *Comprehensive planning, *Political aspects, *Governmental interrelations, Regional development, Non-structural alternatives, Economic efficiency, Water resources development, Local governments. Regulation, State governments, Planning, Multiple-purpose projects, Legislation, Decision making.
Identifiers: Coastal waters, Coastal zone management.

The article considers three impediments to implementation of the California Coastal Plan: the plan's broad scope; problems with clarity of wording; and reliance on local governments for execution. Unusual provisions for coastal zoning and controversial changes in tax structure may undermine public support for the plan and block its legislative passage. In addition, it is not clear that the technical knowledge necessary to implement the plan's goals exists. Some economic-cost criticism has been directed at the plan, but it is not totally justified. Ambiguity of terms is a problem for the plan; and the currently proposed implementing statute does not alleviate this problem. There may be some difficulty with local government implementation since local entities played no role in policy-formation for the plan. Furthermore, the plan does not provide a blueprint for a system of arbitrating conflicts between state and local officials; some provision must be made to facilitate consultation and cooperation. Thus, legislative revision aimed at a solution for intergovernmental conflict, and focusing on key issues of the plan would increase its chances for passage. (Molloy-Florida)
W77-03582

CALIFORNIA WATER PROJECT: LAW AND POLITICS,
California Univ., Berkeley. Dept. of Economics.
For primary bibliographic entry see Field 6E.
W77-03583

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

A COMPUTER PROGRAM FOR ESTIMATING COSTS OF OWNING AND OPERATING AN IRRIGATION WELL UNDER CONDITIONS OF DECLINING WATER LEVELS,
Washington State Univ., Pullman. Dept. of Agricultural Economics.
M. Feldman, and N. K. Whittlesey.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 398, Price codes: A04 in paper copy, A01 in microfiche. August 1976. 65 p, 1 fig, 4 tab, append. OWRT B-051-WASH(1). 14-31-0001-3945.

Descriptors: *Groundwater, *Conjunctive use, *Computer programs, *Estimating costs, *Irrigation wells, Water levels, Costs, *Washington, Model studies, Pumping, Withdrawal, Investment.

A computer program for calculating cost per acre-foot of groundwater under a wide range of specified conditions is described. The existi model applies to conditions found in Adams, L coln, and Grant Counties of eastern Washingt The cost calculations are based on 1973 prices. supplying other prices, tax rates, and power cos the model could be generalized to other times a places. The model does not consider the effects federal income taxes on the real costs of the w investment. The well conditions specified in model include rate of decline of static water le (SWL), capacity, surface head required, month pumping season, aquifer transmissivity, inter rate on invested capital, and permitted decline terval for pump replacement. The model de mines what well and pump equipment will required initially and at replacement intervals. initial purchase cost, and real owning and ope ing costs, are displayed each time new equipm is required. The model calculates costs as production were to cease each time new equ ment is required. The new equipment is added the model then estimates the marginal costs continuing to operate. Per acre-foot costs discounted at various interest rates to obtain t present value.
W77-03211

RESIDUAL WASTE MANAGEME RESEARCH AND PLANNING PROJECTS, S TEMBER 1975,
Environmental Protection Agency, Washing D. C. Water Planning Div.
For primary bibliographic entry see Field 5B.
W77-03355

6D. Water Demand

WATER RESOURCES OF AUSTRALIA A THE PATTERN OF POPULATION CONC TRATIONS,
J. W. Holmes.
National Population Enquiry Research Report 4. Australian Government Publishing Serv Canberra, 1976. 24 p., 2 fig., 15 tab.

Descriptors: *Human populations, *Distribu patterns, *Water requirements, *Water resour *City planning, *Australia, Water supply, W quality, Data collections, Urbanization, Consu tive use, Water utilization.
Identifiers: Albury-Wodonga(NSW-Vic), Mo to(SA), Dampier(WA).

Determination of the urban population which be supported by the water supplies of a give gion involves not only the total consumptive us water, but also the initial quality of the w supply, the possibility of reusing treated effl and the need for a minimum dilution flow to pollution of downstream waters by effluent w acceptable limits. Available data on all these tors for current Australian urban centres are lected and reviewed to derive quantitative pr ples for the planning of future population cen These principles are then applied in detail to t presently-proposed urban growth centres; and general way to derive a maximum-permiss population map of Australia, based on drai divisions. The conclusion reached is that tralia's water resources could support a pote maximum population of about 280 mil (CSIRO)
W77-03278

PLAN OF STUDY OF THE HYDROLOGY THE MADISON LIMESTONE AND SOCIATED ROCKS IN PARTS OF MONTA NEBRASKA, NORTH DAKOTA, SO DAKOTA, AND WYOMING.
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 4B.
W77-03338

JECTIONS OF POPULATION, EMPLOY-NT, INCOME AND WATER USE FOR IOWA ER BASINS, 1975-2020,
a Univ., Iowa City. Inst. of Economic earch.
. Barnard, and W. T. Dent.
1976. 229 p. 4 fig., 101 tab., 28 ref., 3 append.

criptors: *Iowa, *Projections, *Water de-d, Forecasting, Decision making, Planning, mating, Water utilization, Population, nomic prediction, Employment, Income, In-rial water.
tifiers: Demography.

extensive set of demographic, economic, and r use projections for Iowa from 1975 to the 2020 are reported. Past historical trends in the economy at the county level were analyzed then synthesized with a set of national projec-for multi-county sub-national nodal omic areas of the United States which were ered on major urban economic areas, in order evelop the Iowa projection series. Results in-e that the population will grow at the rate of %/year from 1975 to 2020, increasing from ,000 to 3,217,000. Employment will increase out double the rate of population with most of increase in labor force participation coming an increasing number of women seeking em-ment. An increase in productivity per worker yield a 2.71%/year increase in real per capita ne. Development of water use estimates in-ed consideration of water intake, gross use, arge, and consumption. Water use was fused e state input-output model and the concepts of industry water relationships and water mul-rs were also introduced. Iowa's water intake rements are expected to increase at the rate 6%/year, with the electric utility, manufactur-agricultural and residential sectors expected nain the heaviest users. (Luedtke-Wisconsin) 03542

AN WATER USE IN CALIFORNIA.
ornia State Dept. of Water Resources, Sacra-o.
rimary bibliographic entry see Field 6B.
03549

TING WATER DEMANDS IN SACRAMEN-OUNTY.
ornia State Dept. of Water Resources, Sacra-o.
tin No. 104-11, June 1975. 98 p, 28 fig, 16 tab,

riptors: *Water demand, *Surface-ground-relationships, *Conjunctive use, *Water gement(Applied), *Water allocation(Policy), ation, Groundwater availability, Ground-resources, Water supply, Water table, rnia, Optimum development plans, ing, Long-term planning, Water users, Water rvation, Land use, Projections, Forecasting, resources development, Model studies, matical models, Legal aspects, Social ts, Evaluation, Institutions.
fiers: *Sacramento County(Calif), Demog-

ugh Sacramento County, California will have water than it needs for the sum of all an-ed uses from the present time until 2020, ac-upplies available to individual water pur-s will not be proportional to specific pro-demands, and concomitant shortages and ances may be expected. At present, about he county's water supply comes from the d water basin, levels of which have been cu-vely lowered since 1940. In a review of de-data, future population, land use and water ements are projected for 45 years. Using the ted data and a mathematical model of the d water basin, five examples of operational ement plans are simulated--ranging from 100% ground water pumpage to a maximum possible use of surface water. The results indicate that a stable ground water basin can be achieved by use of approximately 58 to 60% surface water. Recommendations call for specific plans to implement the movement of additional water supplies to areas of need, to increase surface water use to save ground water supplies, and to replenish the ground water level by making certain institutional changes impacting on water use in the county. The plan would involve cooperative action between the county government and local water purveyors. (Harris-Wisconsin)
W77-03553

THE STATE OF UTAH WATER - 1975,
Utah Div. of Water Resources, Salt Lake City.
For primary bibliographic entry see Field 6B.
W77-03559

THE STATE OF UTAH WATER.
Utah Div. of Water Resources, Salt Lake City.
September 1972. 20 p.

Descriptors: *Water resources development, *Utah, *Water allocation(Policy), *Future planning(Projected), Water utilization, Inter-basin transfers, Groundwater resources, Hydrology.

The current status of Utah's water resources is summarized and the inherent choices available to meet desired industrial and municipal growth, stabilization of existing rural communities, preserving and/or enhancing recreation and wildlife areas, and creating an institutional and management structure that will encourage effective water allocation and use are generalized. It is estimated that there is 2.5 million acre-feet of surface water available for new uses, 400,000 acre-feet of groundwater, and a 1.5 million acre-feet annually for 50 years of relict water stored in underground reservoirs. Present and future (2020) water use by hydrologic area are computed and alternatives such as inter-basin transfers and desalination are considered, as are potentials for local hydrologic development. The greatest impacts on the state's water resources are water allocation and financing for which the present legislation gives few guidelines. And because the legislation is based on the precept that the state should assist any legitimate water development, its validity is inapplicable to the projected water demand. To allow officials to make defendable choices among potential competing users, at an acceptable cost, comprehensive legislative guidelines are required. (Auen-Wisconsin)
W77-03560

WATER RIGHTS,
Wisconsin Univ., Madison.
For primary bibliographic entry see Field 6E.
W77-03599

6E. Water Law and Institutions

AN APPRAISAL OF CONFLICTING INSTITUTIONAL ATTITUDES ON THE WESTWIDE STUDY REPORT.
Idaho Univ., Moscow. Water Resources Research Inst.
For primary bibliographic entry see Field 6B.
W77-03157

ELECTRIC POWER DEVELOPMENT IN THE PACIFIC NORTHWEST REGION: INSTITUTIONAL COMMITMENTS AND ALTERNATIVES, PHASE I,
Washington Univ., Seattle. Inst. for Environmental Studies.
K. N. Lee, M. E. Marts, R. G. Walton, and A. D. Birmingham.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 382, Price codes: A08 in paper copy, A01 in microfiche. Interim Report, September 1, 1976. 166 p, 3 fig, 1 tab, 2 append. OWRT A-080-WASH(1). 14-34-0001-6050.

Descriptors: *Water policy, *Public rights, *Electric power, Energy, *Pacific nortwest(US), Water resource development, Legal aspects, *Institutions, *Alternative planning, *Electric power production.

Pacific Northwest regional electric power development has been studied with three objectives: (1) to assemble an historical account of institutional arrangements for electric power development in the region; (2) to identify emergent public policy issues; (3) to identify long-range institutional research problems relevant to regional energy and resource development. The historical path of electric power development, stemming from the 1937 Bonneville Project Act, importantly shapes the institutional constraints and opportunities available today. The most important of these is the institutional framework in which the growth of a combined hydroelectric and thermal generating system of regional scale is to be planned, financed, and implemented. The choices have fundamental, long-term -- and yet not publicly visible -- implications for the economic, environmental, and political future of the region. Some developing mechanisms for articulating the political choices -- and controversy -- are evaluated and compared with alternatives.
W77-03288

NATIONAL SAFE DRINKING WATER STRATEGY, ONE STEP AT A TIME.
Environmental Protection Agency, Washington, D.C. Office of Planning and Evaluation.
For primary bibliographic entry see Field 5G.
W77-03357

GREAT LAKES WATER QUALITY; FOURTH ANNUAL REPORT TO THE INTERNATIONAL JOINT COMMISSION.
International Joint Commission-United States and Canada. Great Lakes Water Quality Board.
For primary bibliographic entry see Field 5G.
W77-03383

COLORADO WATER QUALITY CONTROL ACT.
Colo Rev Stat Ann secs 25-8-101 thru 25-8-704 (1973).

Descriptors: *Adoption of practices, *Colorado, *Water quality, *Water pollution control, *Permits, Water law, Water treatment, Pollution, Water pollution treatment, State governments, Water quality control, Water quality standards, Sampling, Water pollution sources, Legal aspects, Legal review.

To preserve the quality of state waters, the Colorado legislature has established a water quality control commission authorized to promulgate and enforce water quality standards. The commission is also authorized to issue waste discharge permits, classify state waters, review applications for underground discharges and review local governmental regulations for individual sewage disposal systems. Sampling, monitoring, recording and reporting shall be done in an effort to detect and remedy water pollution. Authority is granted to enter, in a reasonable time and manner, all lands for investigation of sources of water pollution, as well as to conduct research studies with respect to water pollution. All regulations, standards and decisions shall be subject to judicial review. Regulations for permits are established, and the commission is given the power to construct all necessary pollution facilities. Penalties for violation of these regulations are delineated. (Frank-Florida)
W77-03490

INDIVIDUAL SEWAGE DISPOSAL SYSTEM ACT.
Colo Rev Sta Ann secs 25-10-101 thru 25-10-112 (1973).

Descriptors: *Colorado, *Sewage treatment, *Sewage disposal, *Regulation, Legislation, Standards, Administrative agencies, Local governments, Permits, Penalties(Legal), Law enforcement, Septic tanks, Inspection, Treatment facilities, Installation, Maintenance, Performances, Percolation, Design criteria, Building codes, Effluents, Evapotranspiration.

The Colorado state board of health is required to adopt guidelines providing minimum standards for the regulation of individual sewage disposal systems. Local boards of health must adopt guidelines for their areas of jurisdiction which comply with the state guidelines. Such guidelines must cover all aspects of performance, location, construction, alteration, installation and use of individual sewage disposal systems. Rules must be adopted governing procedures for the application for and issuance of permits, the inspection, testing and supervision of installed systems, the issuance of cease and desist orders, the maintenance and cleaning of systems, and waste disposal. Local boards may require licensing of systems contractors and systems cleaners. The primary responsibility for enforcement of the regulations is placed on the local agencies. (Capehart-Florida)
W77-03491

FLOATING TIMBER ON STREAMS.
Colo Rev Stat Ann secs 36-8-101 thru 36-8-110 (1973).

Descriptors: *Colorado, *Lumber, *Lumbering, *Permits, Rivers, Streams, Appropriation, State governments, Legislation, Legal aspects, Licenses, Administrative agencies, Administrative decisions, Water law, Water use.

Colorado has enacted legislation providing that all state streams can be used for floating logs or timber subject to prior rights of appropriation. A permit must be obtained from the state engineer, however, stating the location of the stream, as well as the booms or structures of all appropriators on the stream. Thirty days after filing, a hearing is held where concerned parties may object. The state engineer may modify or deny a permit if the work will cause damage to existing structures. In addition, the applicant shall post a security bond, but approval by the state engineer does not relieve him from liability for damage. Finally, objections to the hearing result may and should be taken to the district court in the county where the log-rolling is to take place. (Frank-Florida)
W77-03492

SPECIFIC GRANTS OF POWER (CONDEMNATION AND RIGHTS-OF-WAY).
Colo Rev Stat Ann secs 38-2-101 thru 38-2-103 (1973).

Descriptors: *Colorado, *Eminent domain, *Right-of-way, *Facilities, Legislation, Condemnation, Land tenure, Adjacent property owners, Easements, Drainage systems, Legal aspects, Transportation utilities, Water storage, Surface runoffs, Ditches, Roads, Tunnels, Surveys, Appropriation, Bridges, Reservoirs, Pipelines, Railroads.

The state of Colorado has enacted specific grants of power. The power of eminent domain is granted to any corporation to acquire property, rights of way, or easements as needed to construct facilities associated with transportation, public utilities, and water conveyance and storage. Any ditch, reservoir, or pipeline company may acquire by condemnation the right to use unappropriated water. The authority to enter lands for the purpose of surveys is given to corporations constructing roads, ditches, tunnels, or railroads. The power of eminent domain is granted to private landowners to allow construction of a drain for surplus water across the land of another in order to reach a natural waterway. (Capehart-Florida)
W77-03493

RIGHTS TO WATER.
Ariz. Rev. Stat. Ann. secs 45-171 thru 45-175 (1956), as amended, (Supp. 1975).

Descriptors: *Arizona, *Water users, *Water rights, *Prior appropriation, Relative rights, Competing uses, Water allocation(Policy), Administrative agencies, Irrigation, Water conveyance, Channels, Water delivery, Water districts, Water distribution(Applied), Water law, State jurisdiction.
Identifiers: *Water rights(Non-riparian).

Use of water may be severed from land without losing priority already established unless the right is for irrigation usage. Consent of the owner and agency approval are required, however, for transfers of water rights. Transfers cannot be made between irrigation districts and transfers within such districts require district approval. Transfers cannot enlarge rights to use. Natural channels of streams may be used to transport waters, even though channel waters have been appropriated, if such transport does not diminish the use which has been appropriated. In event of dispute in water transport cases, district superintendents will decide the issue. If use of watercourses for carrying water is desired by a reservoir owner, the owner must notify the district supervisor who will insure that the water reaches its proper designation. With regard to use of water for irrigation purposes, land owners are preferred in times of scarcity according to appropriation dates. Vested rights to water use, relative priorities to use, rights judicially determined and rights to acquire property by eminent domain remain unimpaired by this statute. In addition, rights acquired under prior laws remain in effect provided the use of the rights is current. (Comer-Florida)
W77-03494

WATER POLLUTION.
Ariz Rev Stat ann secs 36-1851 thru 36-1870 (1974), as amended, (Supp. 1975).

Descriptors: *Arizona, *Administrative agencies, *Pollution abatement, *Water quality standards, Regulations, Water quality control, Water pollution control, Legislation, Permits, Sediments discharge, Effluents, Public health, Environmental sanitation, Planning, State jurisdiction, Administrative discussions.

Pursuant to statute, the water quality council, a subdivision of the department of Health Services, is given responsibility for water pollution control. The department is given general duties of administration of rules and regulations, administration of grants and loans, development of control and abatement policies and liason duties. The council is required to develop a comprehensive water quality program and to adopt and promulgate rules and regulation to implement the program. Standards may be adopted and altered to regulate water quality. Public hearings are required before standard adoption or amendment. In conjunction with the policy of this act, water pollution and reducing water quality below standards are prohibited and a permit is required to construct or alter any disposal system or to increase or cause increase in waste discharge. Violation charges may be administratively decided and corrective action ordered. The department shall have the power to inspect. Injunction and criminal charges are available as means of prevention of pollution. These statutory penalties are in addition to any common law remedies. (Comer-Florida)
W77-03495

PROVIDENCE AND WORCESTER COMPA
V. EXXON CORPORATION (RIGHT-OF-W
IN LAND SUBMERGED IN TIDEWATER).
359 A2d 329-44 (RI 1976). 16 p, 2 append.

Descriptors: *Rhode Island, *Navigable wat
*Piers, *Right-of-way, Legal aspects, Judi
decisions, Boundary disputes, Easements,
risdiction, Real property, Contracts, Negotiatic
Ships, Transportation, Boats, Navigation, F
bors, Bodies of water.

Plaintiffs sought adjudication of their rights
pier extending into Providence harbor. To
end, plaintiffs brought two actions: the
prayed for a mandatory injunction ordering de
dants to remove certain obstructions from a ri
of-way and permanently enjoining defend
from obstructing the way; the second prayed
declaratory judgment as to the rights, status,
other legal relations of the parties in connec
with the pier and adjoining land. The Supr
Court of Rhode Island held that the trial ju
erred in ordering defendants to execute
veyance of the pier in fee simple to plaintiffs,
pier owner or its successors were not require
demolish existing pier and build a new one in o
to enjoy their rights as reserved under a 1941 d
that a 40-foot wide right-of-way was meant to
vice adjoining lands as well as the pier it
(Cowart-Florida)
W77-03496

CARLSON V VILLAGE OF WO
(PREEMPTION OF LOCAL REGULATION
SANITARY LANDFILL BY ENVIRONMEN
PROTECTION ACT).
343 NE2d 493-504 (111 1975). 11 p.

Descriptors: *Illinois, *Landfills, *Per
*Cities, *Environmental sanitation, Admini
tive agencies, State governments, Environm
control, Regulation, Standards, Judicial deci
Legal aspects, Jurisdiction, Legislation, Pol
aspects, Zoning, Sites.
Identifiers: *Administrative regulations, Inj
tive relief, Licenses.

Plaintiff landowner brought suit to have defen
municipality's ordinance for licensing and re
ing sanitary landfills declared invalid. The pla
had obtained a permit from the state environ
tal protection agency authorizing him to instal
operate a sanitary landfill. Subsequently, the
nicipality enacted an ordinance requiring a
nicipal permit and compliance with municipal
dards. The plaintiff contended that the stat
vironmental protection act preempted the loc
dinance. The defendant contended that sinc
state permit required compliance with local
the ordinance was valid. The trial court dec
the ordinance invalid and the Supreme Court
linois affirmed, saying that the state environ
tal control act is intended to provide a u
statewide program, and thus preempts local
In a supplemental opinion denying rehearing
court stated that procedures available to the
agency are sufficient to set standards for loc
landfills. Strong dissenting opinions maint
that the decision vests more authority in the
cy than was intended by the legislature. The
sents felt that state and local governments s
be allowed to legislate concurrently on env
mental matters. (Capehart-Florida)
W77-03497

STATE DEPT OF POLLUTION CONTROL
TERNATIONAL PAPER
(DETERMINATION OF FISH VALUE T
WERE KILLED BY POLLUTANTS).
329 So2d 5 -9 (Fla 1976). 5 p.

Descriptors: *Legal review, *Florida, *Dam
*Fishkill, Oxygen sag, Biochemical oxyge
mand, Oxygen requirements, Administrative
cies, Administrative decisions, Judicial deci

lties(Legal), Law enforcement, Legislation, stitutional law, Regulation, Water law, Water tion sources, Water pollution effects, Legal cts.
tifiers: *Presumptions(Legal), Hazardous tances.

tiff Department of Pollution Control filed suit nforcement of an administrative decision that ndant paper company had caused a fishkill resulting damages. The trial court dismissed, ng the statute governing determination of ges to be unconstitutionally vague. The eme Court of Florida, on appeal, affirmed issal on the grounds that the amendment orizing the department to administratively mine liability and damages and to seek court rcement of the administrative order could not troactively applied. At the time of the of-, the agency alternatives were either to de- the issues and wait for voluntary compliance seek independent judicial determination of ity and damages. Adoption of the amendment the offense but before procedural action af- substantive rights and retroactive applica- was, therefore, not allowable. Furthermore, asis of damages determination was not un- itutionally vague because no conclusive ef- vas given the statutory formula. A rebuttable mption arose from use of the statutory for- but competent contrary evidence reduced presumption of damage amounts to mere nce. (Comer-Florida)
03498

ER RIGHTS AND LIENS.
Stat Ann secs 36-114 thru 36-115 (Supp 1971).

iptors: *Wyoming, *Water rights, *Real pro- , *Legislation, Land tenure, Appropriation, al government, State governments, Compen- , Contracts, Irrigation, Taxes, Leases, Legal ts, Water law, Water contracts, Payment, cing, Parks.
fiers: *Liens.

rights to all lands acquired under the provi- of this act become appurtenant to the land title passes from the United States to the Any entity that furnishes water for a given f land shall have a first and prior lien on the right and on the land itself for all deferred nts for the water right. This lien takes ence over any other lien created by the land and it remains in force until the final ed water right payment is made. (Capehart-a)
03499

ONING OF, AND OBSTRUCTION TO,

Stat Ann secs 23-115 thru 23-116 (Supp 1971).

iptors: *Wyoming, *Fish, *Poisons, ers, Legislation, Fish management, Fish ges, Fish conservation, Fish ladders, Dams, ures, Toxins, Chemicals, Rivers, Streams, s, Lakes, Ponds, Nets, State jurisdiction, istrative agencies, Water law, Water policy.

ing prohibits persons from using any poison terious drug in any of the waters of the state purpose of catching, killing or destroying his prohibition shall not prevent manufac- or industrial works from operating near any stream or lake providing they build a dam keeps any tailings, saw-dust, chemicals or refuse, deleterious or poisonous substances assing into the stream or lake. It is also un- to place across any rivers, creeks, ponds or ny net, trot-line or any other obstruction prevents the free passage of fish without the t of the fish warden. Furthermore, the fish may arrange for fish ways or ladders to be where they are necessary. (Cowart-)
3500

DITCH COMPANIES.
Wyo Stat Ann secs 17-188 thru 17-193 (Supp 1971).

Descriptors: *Wyoming, *Ditches, *State governments, *Water rights, *Irrigation ditches, Channels, Canals, Conduits, Water conveyance, Trenches, Land, Irrigable land, Water management(Applied), Mills, Mining, Flumes, Structures, Conveyance structures, Water law, Banks.

Ditch companies may be formed in the state of Wyoming by three or more persons who associate for the purpose of constructing ditches which will convey water to mines, mills, or lands. Such persons shall state in their certificate the streams from which the water is to be taken, the line of said ditches, and the use to which said water is to be applied. Ditch companies formed under this article shall have the right of way over the lines named in the certificate. The companies shall be required to keep the banks of their ditches in good condition so that water shall not escape. The companies shall be authorized to mortgage or execute deeds of trust to secure money for the operation of their water works or ditches. Provisions are also set forth for flume companies. (Cowart-Florida)
W77-03501

IRRIGATION AND WATER RIGHTS.
Wyo Const art 8 secs, 1 thru 5.

Descriptors: *Wyoming, *Water rights, *Water distribution(Applied), *Administrative agencies, Legislation, Administration, Water management(Applied), Bodies of water, Lakes, Streams, Natural streams, Springs, State governments, Jurisdiction, Prior appropriation, Regulation, Water allocation(Policy), Beneficial use, Preferences(Water rights), Priorities, Distribution, Diversion, Water law.

The water of all natural streams, springs, lakes or other collections of still water within the boundaries of the state of Wyoming is state property. A board of control shall be established to supervise the appropriation, distribution, and diversion of these waters. Appropriation for beneficial uses shall have priority, but no appropriation shall be denied except when it is demanded by the public interests. In addition, the governor shall appoint a state engineer to preside over the board of control, and to supervise the waters of the state. To aid in this supervision, the legislature shall divide the state into water divisions. (Cowart-Florida)
W77-03502

CONTROL OF WATER AND EMINENT DOMAIN.
Wyo Const art 1, sec 31 thru 32.

Descriptors: *Wyoming, *Water control, *Eminent domain, *Water allocation(Policy), Water distribution(Applied), Water supply, Water demand, Competing uses, Industries, State governments, Industrial water, Channels, Priorities, Reservoirs, Ditches, Drains, Flumes, Compensation, Diversion, Relative rights, Water management(Applied), Agriculture, Mining, Sanitary engineering.

Water is essential to industrial prosperity. Although the water supply in Wyoming is limited, it is capable of being diverted from its natural channels. The control over the water supply should therefore be in the state which shall guard equally all the interests involved. As to eminent domain, private property shall not be taken for private use without the consent of the owner, except for: private ways of necessity and reservoirs, drains, flumes, ditches on or across the lands of others for agricultural, mining, milling, domestic or sanitary purposes. Private property shall not be taken in any case without due compensation. (Cowart-Florida)
W77-03503

GENERAL BASIS OF WATER RIGHTS IN UTAH.
Utah Code Ann secs 73-1-1 thru 73-1-11 (1968).

Descriptors: *Water allocation(Policy), *Utah, *Water rights, *Eminent domain, *Beneficial use, Legal aspects, Appropriation, Preferences(Water rights), Prior appropriation, Public rights, Water law, Reservoirs, Dams, Canals, Ditches, Flumes, Tunnels, Pumps, Equipment, Water storage, Water conveyance, Regulation, State jurisdiction.

All waters in the state of Utah, whether above or under the ground, are the property of the public. Beneficial use shall be the basis, the measure, and the limit of all rights to the use of water in the state. When an appropriator or his successor in interest abandons the use for five years, the rights shall cease and such water shall revert to the public. Any person shall have a right of way across public, private, and corporate lands for the construction, maintenance, repair and use of all necessary reservoirs, dams, water gates, canals, ditches, flumes, tunnels, pipelines and areas for setting up pumps and pumping machinery upon payment of just compensation. The purpose of the right of way shall be to secure, store, replace or convey water for domestic, culinary, industrial and irrigation needs. The rights and duties of owners of ditches and canals are enumerated. Provisions are made for the conveyance of water rights. (Cowart-Florida)
W77-03504

FLOOD CONTROL PROJECTS AND DROUGHT EMERGENCIES.
Utah Code Ann secs 17-8-1 thru -7 (1973), as amended (Supp 1975).

Descriptors: *Eminent domain, *Utah, *Flood control, *Flow control, *Multiple purpose projects, Flood protection, Flood routing, Water distribution(Applied), Water utilization, Droughts, Legislation, Flood plains, River flow, Public health, Administration, Local governments, Federal government, Regulation, Water resources development.
Identifiers: *Flood channels.

Utah has enacted legislation empowering boards of county commissioners, to contract with the United States for the construction and maintenance of any flood control project within county jurisdiction. In Addition to being within the contracting county, the project must be designed to abate or control flood waters, or any excessive accumulation of water, for the protection of life and property. A board may further contract and pay expenses to acquire easements and relocate public roads or bridges when replacement is necessitated by any flood project construction. In addition, the state engineer shall distribute the waters and operate the completed project. County boards are also empowered to authorize the clearing, improving, and fencing of natural channels, the construction of new channels, and to enforce anti-pollution laws within their respective counties. A final provision concerns the protection of flood channels and flood plains. (Lauer-Florida)
W77-03505

WATER, LIGHTING AND SEWERS.
Utah Code Ann secs 10-7-4, 10-7-12 thru -14.1 (1973).

Descriptors: *Utah, *Water supply, *Cities, *Water rights, *Public health, Water users, Water requirements, Water purification, Consturction, Water pollution, Treatment facilities, Water treatment, Municipalities, State governments, Water storage, Public rights, Legislation, Condemnation.

Utah has enacted legislation providing that any city or town may acquire, purchase or lease any water, waterworks system, water supply or property connected therewith. The cities or towns

may also bring condemnation proceedings to acquire the above. The resident taxpayers have a right to protest the acquisition of property and a special election is to be held to resolve the protest issue. The cities and towns have also been granted several miscellaneous rights and powers, including the power to limit use of water for any purpose other than domestic in the event of scarcity of water, and the right to enter upon any premises furnished with water by such city or town. It is the public policy of Utah to grant the privilege to municipalities to raise funds to improve health standards by providing facilities for the purification of drinking water and the treatment of raw sewage. (Martin-Florida)
W77-03506

HEAD GATES; POWERS OF STATE ENGINEER.
Utah Code Ann secs 73-5-4 and 73-5-9 (1968).

Descriptors: *Utah, *Water measurement, *Diversion, *Mechanical control, Equipment, Reservoirs, Priorities, Ditches, Regulation, Water allocation(Policy), Water utilization, Flumes, Weirs, Prior appropriations, Water control, Legislation, Construction, Consumptive use, Water distribution(Applied).
Identifiers: *Headgates.

Utah has enacted legislation providing that every person using water in the state shall construct or install and maintain a headgate or other measuring device at each point where water is diverted or turned out for the purpose of regulating and measuring the quantity of water used. These measuring devices must be approved, locked, and kept set by the state engineer. Flumes or other measuring devices may be required at points along ditches to determine the amount of water to be diverted from a stream to the ditch. Owners of reservoirs may also be required to construct and maintain a measuring device above the reservoir on each stream or source of supply discharging into the reservoir in order to determine the amount of water to which prior appropriators are entitled. The state engineer may require the construction of measuring devices to prevent waste, loss, pollution or contamination of water above or below ground. The owner shall incur the expense of complying with any requirement made by the state engineer. If after notice, the owner has not carried out the requirement, the state engineer may forbid the use of such water. (Lauer-Florida)
W77-03507

SUSPENSION AND RESTORATION OF RIGHT TO APPROPRIATE.
Utah Code Ann secs 73-6-1 thru -2 (1968).

Descriptors: *Surplus water, *Utah, *Appropriation, *Water supply, *Water utilization, Water control, Public health, Water allocation(Policy), Water conservation, Beneficial use, Regulation, State governments, Water resources development, Water demand, Unappropriated water.
Identifiers: Water preservation.

Upon recommendation of the state engineer, the governor of Utah may suspend the right of the public to appropriate surplus or unappropriated waters when the welfare of the state demands it. The utilization of surplus and unappropriated waters of any stream may be suspended for any use whatsoever to preserve such waters. Waters withdrawn from appropriation may be restored by proclamation of the governor upon the state engineer's recommendation. Such proclamation shall not become effective until notice has been published within the boundaries of the water source. (Lauer-Florida)
W77-03508

IRRIGATION DISTRICTS.
Utah Code Ann secs 73-7-1 and -11 (1968).

Descriptors: *Irrigation districts, *Utah, *Water management(Applied), *Irrigation, *Water districts, Legislation, Jurisdiction, Water supply, Governments, State jurisdictions, Legal aspects, Administrative agencies, Bodies of water, Reservoirs, Canals, Ditches, Distribution systems, Irrigation programs, Water distribution(Applied), State governments.

In order to conserve public waters of the state of Utah, the governor may propose the organization of irrigation districts. Ditches, canals, reservoirs and franchises constructed before the passage of this act are exempt from this law unless such district shall be formed to purchase, acquire, lease or rent such ditches, canals or reservoirs. Resident entrymen upon public lands of the United States and purchasers of state lands shall be deemed to be owners of lands within the district for the purpose of becoming petitioners for the organization of such districts. A board of directors shall have the following powers: (1) to conduct the business of such district; (2) to allot water to each forty-acre tract; (3) to construct or acquire canals, ditches and reservoirs necessary to the operation of the district; (4) to acquire rights of way by condemnation and (5) to rent or lease water. (Cowart-Florida)
W77-03509

PUBLIC INLAND LAKE PROTECTION AND REHABILITATION.
Wis Stat Ann secs 33.001 thru .29 (Supp 1975).

Descriptors: *Administrative agencies, *Wisconsin, *Lakes, *Protection, *Rehabilitation, Environmental effects, Wildlife conservation, Public benefits, Planning, Surveys, Water pollution control, Navigable waters, Data collections, Legislation, State government, Administration, Financing, Legal aspects, Water resources, Water districts.
Identifiers: *Public inland lakes, Districts.

In order to protect and rehabilitate the public inland lakes of this state, the Wisconsin legislature has initiated a comprehensive lake program. The inland lakes protection and rehabilitation council shall advise the department of natural resources on all matters pertaining to lake rehabilitation and the abatement of lake pollution. The primary goal of activity under this chapter shall be to improve the quality of public inland lakes. Districts may undertake rehabilitation projects which shall be divided into study, planning and implementation phases. A district desiring financial assistance shall apply to the department. Districts may be created for the purposes of undertaking a program of lake protection and rehabilitation. Management of the affairs of the district shall be delegated to a board of commissioners. (Martin-Florida)
W77-03510

VILLAGE OF LOMBARD V STATE POLLUTION CONTROL BOARD (POLLUTION CONTROL BOARD WITHOUT AUTHORITY TO IMPOSE REGIONALIZATION UPON LOCAL GOVERNMENTAL BODIES).
346 NE2d 196-202 (Ill App Ct 1976). 7 p.

Descriptors: *Illinois, *Local governments, *Legal review, *Water pollution control, *Administrative agencies, Environmental control, Waste water disposal, Waste water treatment, Regional development, Regions, State governments, State jurisdiction, Legal aspects, Water pollution.

Plaintiff village sought to restrain defendant Pollution Control Board from establishing a county-wide wastewater program. The plaintiff objected to its required inclusion, and claimed that the Board did not have proper authority under Illinois law. The Board asserted that it had broad power to order county-wide regionalization that included the Village of Lombard. The Appellate Court of Illinois held that in the absence of any specific authority, the Board did not have the power to im pose wastewater regionalization on municipalitie sanitary districts, or other local, government bodies without their consent. (Frank-Florida)
W77-03511

CLIPPINGER V BIRGE (RIPARIAN RIGHTS I AN ARTIFICIAL LAKE).
547 P2d 871-80 (Wash Ct App 1976). 10 p, 1 fig.

Descriptors: *Artificial lakes, *Contou *Washington, *Judicial decisions, *Access rout *Public access, Public rights, Riparian righ Riparian waters, Ownership of beds, Roa Dikes, Erosion, Sea level, Legal aspects.
Identifiers: *Injunctive relief.

Plaintiff owner of an interior lot brought a against defendant owners of a lot fronting on artificial lake to enjoin the waterfront owners fr interfering with the right of access to the lake interior lot owners and to recover damages f past interference and harassment. The evide supported the findings that the contour line a was fixed at the time of the deed did not shift erosion or other earth changes caused a shift in actual location of that point above sea level on ground. More importantly, the plaintiff was no riparian owner of the land since his property w not contiguous to the lake and was separated fr the lake both by a public road and by a strip of l owned by the defendants. Since the lake was an tificially created private reservoir, there were riparian rights to its use and any rights parties m have had to use the bed in the waters of the l must derive from their deed. Injunctive relief w therefore, denied. (Frank-Florida)
W77-03512

GREAT LAKES COMPACT COMMISSION.
Wis Stat Ann sec 14.78 (1972).

Descriptors: *Wisconsin, *Great Lakes, *W resources development, *St Lawrence Seaw *Interstate compacts, Interstate commissio Inter-agency cooperation, Education, Navig waters, Lake Michigan, Financing, Inland wa ways, Canals, St Lawrence River, Lake Super Lakes, Great Lakes Region, Legislation.
Identifiers: *Great Lakes compact commiss *Great Lakes Basin Compact.

Wisconsin has enacted legislation creating Great Lakes compact commission. The gover shall appoint five commissioners, one of wh shall serve as secretary and be a state employe indefinite duration. The other positions carry salaried four year terms. The commission's du include: representing Wisconsin on the G Lakes commission; maintaining a continuing vestigation of the St. Lawrence Seaway Proj lobbying for additional legislation to further development of the waterway; devising and ecuting an educational program in support of project; and the filing of annual reports regar the commission's activities. The Wisconsin c mission is, in addition, authorized to contribut the Great Lakes commission a sum not gre than the amount appropriated for that purp Furthermore, the statute directs all state offic agencies, and employees to aid the commissio furtherance of the Great Lakes Basin compac providing data, personnel, and any o assistance requested. (Moorhouse-Florida)
W77-03513

1971 SHORELINE MANAGEMENT ACT.
Wash Rev Code Ann secs 90.58.010 thru (Supp 1975).

Descriptors: *Shore protection, *Washing *Coasts, *Legislation, Shores, Recreation, P access, Project planning, Natural resou Long-term planning, Coastal structures, lands, Public rights, Conservation, Preserva

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ogy, Local governments, High water mark, ms, Lakes, Tidal waters.
ifiers: *Coastal zone management.

state of Washington has enacted a shoreline gement act for the purpose of preserving, cting, restoring and utilizing the natural rces of the shoreline. The policy of the act is ow all reasonable and appropriate uses while cting the land, waters, and wildlife from ad- effects. Specific shorelines have been nated 'shorelines of state-wide significance'. er programs to be developed for these lines by local governments shall give rence to shoreline uses which: (1) protect the interest over the local interest; (2) preserve tural character of the shorelines; (3) result in term rather than short-term benefits; (4) pro- he shoreline ecology and resources; (5) in- e public access to public areas; and (6) in- e public recreational opportunities. Permitted must minimize ecological and environmental ge and, where possible, must not impede the 's use of the water. (Capehart-Florida)
03514

GATION DISTRICTS POWERS AND PUR- S.
Rev Code Ann secs 87.02.005 and .010 , and .015 (Supp 1975).

iptors: *Washington, *Irrigation districts, er distribution(Applied), *Irrigation opera- nd maintenance, *Conveyance structures, rights, Conduits, Governments, Sewage ent, Irrigation, Water contracts, Electric , Sewers, Hydrants, Contracts, Legislation, governments.

ion districts may be organized whenever r a majority of title holders to land susceptible irrigation desire. The district may be formed e purpose of: (1) construction or purchase of for the irrigation of lands; (2) reconstruction provement of existing works; (3) operation or enance of the works; (4) construction and enance of diverting conduits; (5) execution ntracts; and (6) performance of everything sary to exercise the powers granted to the t. The district has the power to: (1) purchase ll electric power to the districts' inhabitants; nstruct and maintain a system for the sale of to district inhabitants for domestic pur- (3) maintain drains, sewers, and sewage ent plants; (4) assume any indebtedness to nited States because of the district lands; (5) uct and maintain water conduits used to water used within cities and towns; (6) install aintain water mains and fire hydrants used e fighting; (7) contract with other irrigation ts; and (8) acquire the water system from ater district situated wholly within the irriga- strict's boundaries and provide water for tic use of the district's residents. (Rieck-)
3515

RWAY DISTRICTS.
Rev Code Ann secs 91.04.010, .170 thru .200

ptors: *Channel flow, *Engineering struc- *Washington, *Local governments, Water (Legal aspects), River regulation, Beds, Channels, Legal aspects, Eminent , Right-of-way, Construction, Water con- ater flow, Stream flow, River flow, Stream ement, River beds, Ditches, Canals, Bodies er, Canal construction, Flumes, Locks, res, Dikes, Overflow, River training, tion.
ers: *Waterway districts.

unty or portion thereof requiring commer- terways may be organized into a commer- terway district and shall have the right to sue and be sued in the name of its board of commissioners. The districts shall have: the right of eminent domain to purchase property for use in the commercial waterway system; the power to alter all watercourses flowing through the district; the right to construct all necessary artificial applicances to protect the land or preserve and maintain the waterway system; the power of eminent domain to acquire property for the construction of landing places or other aids to navigation; and the authority to acquire rights of way over any land in the state of Washington provided no city or town's authority to construct in, upon, under, above, or across the waterways shall be impaired, unless this right will materially affect the efficiency of the waterways. Waterway districts are given all rights of the state concerning any beds or shores within the district. This confers the power to sell the beds or shores and use the proceeds for the expenses of the district or to exchange the beds or shores for other needed property. (Rieck-Florida)
W77-03516

EMINENT DOMAIN.
Wash Rev Code Ann secs 8.28.050 and 8.12.030 (1961).

Descriptors: *Washington, *Eminent domain, *Condemnation, *Cities, Watersheds(Basins), Properties, Water pollution, State governments, Swamps, Marshes, Ponds, Aqueducts, Reservoirs, Freshwater, Legislation, Legal aspects, Compensation.

Any municipal corporation of any state adjoining the state of Washington may acquire by purchase or condemnation, title to any land or water right within any watershed in the state of Washington. Every city and town within the state of Washington is authorized and empowered to condemn land and property for various purposes, including: (1) draining swamps, marshes, tidelands, tideflats or ponds, or filling the same, within the limits of the city; (2) constructing aqueducts, reservoirs, pumping stations and other structures, either within or without the city limits, for conveying into and through such city a supply of fresh water; (3) protecting such supply of fresh water from pollution; and (4) building drains and sewers. (Martin-Florida)
W77-03517

GLASSMAN V. WELDIN FARMS, INC. (NO RIGHT IN UPPER LAND OWNER TO ARTIFICIALLY INCREASE THE NATURAL DRAINAGE OF SURFACE WATER TO INCREASE FLOODING ON LAND OF LOWER PROPERTY).
359 A2d 669-81 (Del Ct Ch 1976). 13 p.

Descriptors: *Delaware, *Surface drainage, *Surface waters, *Floods, Judicial decisions, Legal aspects, Rain, Rain water, Water injury, Drainage water, Water law, Water rights, Streams, Competing uses, Riparian rights, Reasonable use, Overflow, Water levels, Banks, Flood damage.

Plaintiffs, lower property owners, brought an action to enjoin defendant, upper property owner, from draining increased amounts of surface water into a small creek which passes through the plaintiffs' property. The county government and the State Department of Highways were joined as defendants to the extent they may be necessary to the granting of complete injunctive relief. Plaintiffs argued that under the law of Delaware an upper landowner may not artificially increase the flow of surface waters upon a lower landowner above the natural level, no matter how minimal the increase may be. Defendant, upper landowner, argued that the test under Delaware law is that of reasonable use, and that in the absence of evidence of substantial injury, the lower landowner has no standing to object to a minimal increase caused by the upper owner. The Court of Chancery granted injunctive relief to the plaintiffs holding that where intermittent heavy rainfall causes a natural waterway to overflow its banks, an upper landowner may not artificially increase drainage into that waterway in such a manner as to enlarge the area of flooding on the property of the lower owner, regardless of how insubstantial the increase may be. (Cowart-Florida)
W77-03518

COMMONWEALTH V. BARNES AND TUCKER COMPANY (PUBLIC NUISANCE OF ACID MINE DRAINAGE).
353 A2d 471-81 (Pa. Commonwealth Ct. 1976). 11 p.

Descriptors: *Pennsylvania, *Coal mines, *Mine drainage, *Acid mine water, *Mine wastes, Mining, Industrial wastes, Mine acids, Acidic water, Coal mine wastes, Deep-well pumping, Judicial decisions, Constitutional law, Legal aspects, Subsurface waters, Geology, Percolating water, Percolation, Mine water.
Identifiers: Mine hydrology.

Plaintiff, Commonwealth of Pennsylvania, brought an action in equity to require the owner of a closed mine to treat acid mine drainage which was discharging from the mine. Defendant mine owner advanced a number of constitutional arguments, including one that an order abating the discharge as a public nuisance would be an unconstitutional taking of property without just compensation. The Supreme Court of Pennsylvania had found that there was a basis upon which the Commonwealth could be granted relief, and then remanded to the Commonwealth Court for determination of the issue of whether relief should be granted. That court held that the defendant mine owner did not qualify as exempt from the imposition of relief in abatement of a public nuisance for want of conduct or activity by it bearing upon the forces and conditions producing the public nuisance. The court therefore enjoined the defendant from causing or permitting the discharge of untreated acid mine water drainage. (Cowart-Florida)
W77-03519

CACHE LA POUDRE WATER USERS ASSOCIATION V GLACIER VIEW MEADOWS (APPROPRIATION OF WATER IN PLAN OF AUGMENTATION).
550 P2d 288-96 (Colo 1976). 9 p.

Descriptors: *Diversion, *Appropriation, *Colorado, *Consumptive use, *Wells, Well permits, Water users, Competing uses, Water utilization, Rivers, Water supply, Water resources, Reservoirs, Water management(Applied), Water rights, Administrative agencies, Diversion losses, Diversion loss returns, Water loss, Preferences(Water rights), Riparian rights.

Appellee, a developer of residential lots in the mountains, sought approval from the water court of two plans of augmentation. The plans would provide future owners of presently unimproved lots with domestic water from wells to be drilled in the future. After the augmentation plans were approved, appellants, a ditch and reservoir company and a non-profit protective association, appealed. The appellants contended that the river in question was overappropriated and that authority for the plan could not be completely predicated upon the exempt status of many of the wells. The Supreme Court of Colorado accepted these two objections, but nevertheless affirmed with some modifications. The plans were valid so long as the diversion of the water did not injure holders of vested rights; furthermore, all the wells involved in the plan were required to be treated as if they were nonexempt. The cause was, therefore, remanded with directions to modify the water court's findings. (Cowart-Florida)
W77-03520

TALLEY V CARLEY (PRIORITIES TO WATER IN 1963 AMENDMENT TO 82 OKLAHOMA STATUTES ANNOTATED SECTION 1-A).
551 P2d 248-52 (Okla 1976). 5p.

Descriptors: *Oklahoma, *Priorities, *Beneficial use, *Consumptive use, Appropriation, *Irrigation water, Preferences(Water rights), Legal aspects, Streams, Constitutional law, Water law, Legislation, Legal review, Competing uses, Hydrography, Surveys, Riparian rights, Relative rights, Administrative agencies.

Landowners sought to set aside the finding of the District Court that the Water Resources Board's final order of priorities to water from a creek was binding upon them. Appellants' land was upstream approximately one mile north of the land owned by appellees. Both parties asserted beneficial use of water from the creek prior to 1963. The pre-1963 law defining water rights required that a hydrographic survey was necessary to establish rights and priorities. The Supreme Court of Oklahoma held that the 1963 amendments provided that priorities could be determined based upon beneficial use prior to the effective data of the Act, and that priority dated from the initiation of the beneficial use. Therefore, appellants would have been able to establish their priorities under the new schedule, even though a hydrographic survey was never accomplished. The court found that the Water Resources Board failed to give meaningful notice to appellants, so their determination of appellants' priority rights was a nullity. In order to determine appellants' priority, another hearing before the Board was ordered. (Cowart-Florida)
W77-03521

FLOOD DISASTER PROTECTION ACT OF 1973,
Central and Southern Florida Flood Control District, West Palm Beach.
For primary bibliographic entry see Field 6F.
W77-03522

USEFUL MODELING CONCEPTS FOR THE FCD WATER SYSTEM,
Central and Southern Florida Flood Control District, West Palm Beach.
For primary bibliographic entry see Field 6A.
W77-03524

WATER MANAGEMENT AND REGULATION OF WATER USE,
Central and Southern Florida Flood Control District, West Palm Beach.
For primary bibliographic entry see Field 6B.
W77-03525

PAINT FORMULATING POINT SOURCE CATEGORY EFFLUENT GUIDELINES AND STANDARDS.
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W77-03526

VIRGINIA STATE PROGRAM FOR CONTROL OF DISCHARGE OF POLLUTANTS TO NAVIGABLE WATERS; APPROVAL.
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W77-03527

ORGANIC CHEMICALS MANUFACTURING POINT SOURCE CATEGORY-EFFLUENT LIMITATIONS AND GUIDELINES (AMENDMENTS TO REGULATIONS-BUTADIENE).
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W77-03528

PROPOSED TOXIC POLLUTANT EFFLUENT STANDARDS.
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W77-03529

SECONDARY TREATMENT INFORMATION; BIOCHEMICAL OXYGEN DEMAND, SUSPENDED SOLIDS AND PH.
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W77-03530

MARINE SANITATION DEVICE STANDARD.
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W77-03531

UNIONS FIGHT A JONES ACT WAIVER.
Business Week, No 2370, p. 44, March 3, 1975. 1 p, 1 photo.

Descriptors: *Oil industry, *Oceans, *Water pollution, *Ships, *Legislation, *United States, Federal government, Legal aspects, Transportation, Natural gas, Oil, Alaska, Massachusetts, Access routes, Distribution, Distribution systems.
Identifiers: *Jones Act, *Unions, *Waivers, *Gas reserves.

The Jones Act, passed in 1920, stipulates that shipping between domestic U. S. ports, including those of Alaska, Hawaii, and Puerto Rico, be carried exclusively in U. S. flagships built in U. S. shipyards and manned by American seamen. Waivers for any of these requirements may be allowed only in the interest of national defense. Currently, New England LNG Inc. wants to use a Liberian ship to carry natural gas supplies from Alaska to Boston. The company says that no ships are available and that gas reserves are needed. The maritime industry, led by the Seafarers International Union, calls it an attempt to dodge shipping taxes and evade the law. A decision on the matter will be forthcoming from the Secretary of the Treasury. (Frank-Florida)
W77-03532

A SWEEPING SEA LAW IN 1976.
Business Week, No 2424, p 167-68, March 22, 1976. 2 p, 1 tab.

Descriptors: *Continental shelf, *Law of the sea, *United Nations, *Fishing, *Environmental effects, International law, Navigation, Water law, Oceans, Mining, Mining engineering, Manganese, Nickel, Copper, Water pollution, Oil pollution, Legal aspects, Foreign countries.
Identifiers: *Coastal waters, *Water rights(Non-riparian).

The Third United Nations Law of the Sea Conference will attempt to negotiate specific treaty provisions pertaining to the governing of the oceans. As to deep sea mining, the Third World bloc of nations wants an International Sea-bed Authority with broad powers to limit the amount of materials to be extracted, to set prices, and to allocate mining sectors. Besides conserving natural resources, these broad powers would protect the commodity export markets of the developing nations. The developed countries, however, who possess the technology to conduct large-scale deep sea mining ventures, want an International Authority limited to issuing licenses and assuming royalty payments to other countries. Another potentially troublesome issue involves the straits. As territorial waters are expanded to 12 miles from 3, certain straits might be closed off, as they a not 24 miles wide. Among these are the straits Gibraltar and Dover, as well as the Malac Straits. If these straits are closed to navigation, shipping prices would significantly increase. Pol tion is also becoming a point of contention. So countries want the flag state--the one in which t ship is registered--to be responsible for the forcement of pollution rules. This would prev the United States from seizing a Russian ship polluting te waters around Alaska. Fishing rig were thought to be far from settled, but individ countries have signed treaties with each other t set license fees for fishing rights in different are Hopefully, this spirit of negotiation will result an international fishing treaty. (Frank-Florida)
W77-03533

THE HARD JOB OF SAVING LAKE ERIE.
For primary bibliographic entry see Field 5G.
W77-03534

THE COST OF COASTAL ZONING.
Business Week, No. 2430, p 71, 74, May 3, 197 p, 1 photo.

Descriptors: *California, *Legislation, *Zon *Regulation, *Shore protection, Shores, C demnation, Condemnation value, Beach Seashores, Coastal engineering, Coastal st tures, Marsh management, State governme Regional development, Property values, L aspects.
Identifiers: *Coastal zone management, Prop tion 20(Calif).

California has led the nation in protection of coastline, but it is being challenged at the pre time to keep up that standard. Under Californ Proposition 20, voters have set up a series of t porary state and regional coastal commission lay the groundwork for an eventual statev coastal zoning plan. The commissions ultima produced a bill calling for state acquisition of spoiled natural areas, concentration of co growth in already developed areas, maximum cess to beaches, and stringent controls ove development in an area running from 1,000 y to as much as 5 miles inland. Businessmen fighting the legislation, complaining that buil costs will skyrocket and that many jobs wi lost. In a related development concerning in zoning a United States District Court in Ar Ltd. Partnership v. City of Palo Alto ruled tha city's open-space zoning regulations resulted i verse condemnation of 515 acres of r foothills. The city preferred not to buy the but merely to zone it so as to preclude undesi development. A second trial to assess damag forthcoming, with the amount expected to the millions -- the difference in property value fore and after the re-zoning. If the holding is mately upheld, it could have a significant im on stringent coastal area zoning. (Frank-Florid
W77-03535

THE LEGAL FRAMEWORK FOR PUBLIC TICIPATION IN CANADIAN WA MANAGEMENT,
Canada Centre for Inland Waters, Burlin (Ontario).
C. G. Morley.
Social Science Series No. 14, 1975. 74 p. 71 ref

Descriptors: *Canada, *Decision making, *P rights, *Legal aspects, Resources develop Legislation, Common law, Social participatio
Identifiers: *Resource management, *Public ticipation.

The legal basis for public participation in res management was examined by focusing on vant federal and provincial legislation as w common law cases. It was found that: (1 Canadian legal system does not guarante

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en a right to participate in resource develop-
t and management decisions, (2) under com-
law, a citizen can be heard by the decision
ing body and can also make claims for com-
ation, (3) the system is reactive, since the
tiff must prove damages and legal redress can
occur after the fact, (4) public hearings,
gh allowing the presentation of the public's
s, are structured, one-way forms of communi-
n which are inadequate to assert environmen-
ghts, (5) the convening of a public hearing is a
etionary power given to an official under
ral and provincial legislation, (6) the exercise
is discretion together with the lack of formal
nels to express discontent could intensify the
ical controversy of issues, and (7) public
ings allow the public very little access to the
ation of environmental policy. Based on these
ngs, a number of recommendations are made,
entral one being that effective participation in
ion making must be established by legislation
h makes suuch participation a legal right.
dtke-Wisconsin)
-03543

OBJECTIVES, PART I OF THE STATE
ER PLAN, (IDAHO WATER RESOURCES
RD).
o Water Resource Board, Boise.
rimary bibliographic entry see Field 6B.
-03544

ER FOR NEVADA. WATER PLANNING
ORT.
da Div. of Water Resources, Carson City.
e of State Engineer..
rimary bibliographic entry see Field 6B.
03545

A'S WATER RESOURCES PROGRAM
GRESS AND NEEDS.
Natural Resources Council, Des Moines.
rimary bibliographic entry see Field 6B.
03547

FORNIA'S GROUND WATER.
rnia State Dept. of Water Resources, Sacra-
o. Div. of Planning.
rimary bibliographic entry see Field 4B.
03548

CALIFORNIA STATE WATER PROJECT
75.
rnia State Dept. of Water Resources, Sacra-
o.
rimary bibliographic entry see Field 6B.
03551

STATE OF UTAH WATER.
Div. of Water Resources, Salt Lake City.
rimary bibliographic entry see Field 6D.
03560

WATER RESOURCES FRAMEWORK
Y PLAN OF STUDY.
Natural Resources Council, Des Moines.
ical Coordinating Committee.
imary bibliographic entry see Field 6B.
3561

LES IN THE PATH OF COASTAL PLAN
EMENTATION,
imary bibliographic entry see Field 6B.
3582

FORNIA WATER PROJECT: LAW AND
ICS,
rnia Univ., Berkeley. Dept. of Economics.
aylor.

Ecology Law Quarterly, Vol 5, No 1, p 1-52 (1975). 52 p.

Descriptors: *California, *Land reclamation, *Acreage, *Federal Reclamation Law, *Land tenure, *Federal project policy, Arid lands, Projects, Water resources development, Water supply development, Political aspects, Farm units, Water policy, Cost allocation, Cost repayment, Water supply, Water management(Applied), Federal jurisdiction, State jurisdiction, Federal-state water rights conflicts, Legislation, Administrative decisions, Judicial decision.

The California Water Project of 1960 is a classic illustration of large landowners circumventing federal water policy. Although water availability in the arid California farmlands is a major problem, land ownership in the region is concentrated into large holdings and federal reclamation law has excess acreage requirements with 160 acre limits. When federal funding was first authorized in the region during the depression, opposition was small because of resident desperation. Since then a thirty year battle has ensued. The first means of circumvention attempted was state project funding. Economics mitigated otherwise, however, and federal funds were required. Floor battles in the House and Senate followed in attempts to get federal funds with an exemption from the acreage limit. The exemption was defeated but an additional provision for further approval left doors open. The Solicitor of the Interior, in interpreting the Congressional result, determined that Congress intended exemption; thus, when the federal-state contract was sent to Congress for approval it was approved without the acreage limitation. Although California courts had held the limit applicable to the project, when a Federal court decision was sought the large landowners won. (Comer-Florida)
W77-03583

FREEDOM OF BEACH,
R. Bongartz.
N. Y. Times Magazine, p 12-13,27,30-32, July 13, 1975. 6 p, 4 photo.

Descriptors: *Beaches, *Access routes, *Right-of-way, *High water mark, *Law enforcement, Transportation, California, Oregon, Connecticut, Public access, Public rights, Public benefits, Legal aspects, Trespass, Easements, Piers.
Identifiers: *Coastal waters, *Public beach access.

Towns and villages have been trying to regulate the use of shoreline swimming areas for a long time. To protest beach restrictions and 'private' beaches, activists like Ned Coll once a weekend during the summer months, bus black children and their parents from Hartford, Connecticut, into private beach areas around the state. Coll's plan is to emphasize the need for open beaches accessible to all. While in the west, notably in California and Oregon, there are laws protecting beach access for the public, the east lags far behind. A National Open Beaches Bill has been introduced in Congress, but its passage seems uncertain. It would grant to the public the absolute right to use all beaches not owned by the government or set aside for other purposes. The Supreme Court recognizes the mean high tide line as dividing public from private areas. Ned Coll has been leading his charges over beach walls in an attempt to publicize his philosophy that the entire shore of the country should be open to the public. (Frank-Florida)
W77-03584

A CLOSER LOOK AT SOME ISSUES FOR GENERA-OCEANS POLICY, MARINE ENVIRONMENT, AND FISHERIES,
Columbia Univ., New York. School of Law.
L. H. Henkin.
Columbia Journal of Transnational Law, Vol 14, No 1, p 56-79 (1975). 24 p.

Descriptors: *Continental shelf, *Law of the sea, *Treaties, *International law, *Oceans, Navigation, Legal aspects, Fisheries, Commercial fishing, Environmental effects, Environmental control, International waters, Foreign waters, Seas, Bodies of water, United Nations, Governments, Foreign government, United States.
Identifiers: *Coastal waters, *Law of the Seas Conference, Coastal zone management, Territorial seas(Jurisdiction).

In all probability, any law of the sea treaty will extend the territorial sea to twelve miles and provide coastal states with 200 mile economic zones. The impact of such a zone on land-locked nations and those with short coastlines will be grave since virtually all ocean resources will fall within some coastal nation's economic zone. Alternative methods of oceanic subdivision, such as the 'straight baseline' approach, will only lead to greater conflicts. While the present juridictional framework allows for exploitation of fisheries and other resources and fails to provide environmental standards for the seas, the economic zone approach offers no significant improvements. Agreements on resource utilization are difficult to reach as each nation ideally wants its own zone exclusively and the free use of the zones of others as well. Similarly, pollution standards also create international controversy. Smaller nations concerned with development oppose environmental obstacles to their growth while larger nations reject a double standard approach. Yet another source of conflict in the proposed treaty is the method of dispute settlement. Ad hoc arbitration lacks uniformity and the International Court of Justice lacks expertise. Therefore, although it may create additional expense and bureaucracy, the establishment of a Law of the Sea Tribunal is preferred. (Moorhouse-Florida)
W77-03585

THE MUDDY ROAD TO CLEAN WATER,
For primary bibliographic entry see Field 5G.
W77-03587

IMPLEMENTING THE NATIONAL WATER POLLUTION CONTROL PERMIT PROGRAM: PROGRESS AND PROBLEMS.
For primary bibliographic entry see Field 5G.
W77-03588

ENVIRONMENTAL CONCERN AS A FACTOR IN COASTAL ZONE DEVELOPMENT: A STUDY OF LOUISIANA CITIZENS,
Louisiana State Univ., Baton Rouge. Dept. of Rural Sociology Research.
For primary bibliographic entry see Field 6G.
W77-03590

COMING SHOWDOWN: OCEAN NATIONALISM AND THE SENATE 200-MILE SHELF BILL,
Villanova Univ., Pa. Inst. of World Order Research.
J. Logue.
America, Vol 133, p 466-69, December 27, 1975. 8 p.

Descriptors: *Continental shelf, *Water resources development, *Law of the sea, *United Nations, *Legal aspects, Treaties, Fishing, Fish harvest, Commercial fish, Fish farming, Fish populations, Organizations, Foreign countries, Governments, Shores, Continental slope, International law, Oceans, Water law, United States, Federal government, Continental margins.
Identifiers: *Coastal zone management, *Economic zones.

A showdown is imminent between the United States Congress and the nations of the world who are trying to negotiate a new Law of the Sea at the Third United Nations Conference. Preliminary

votes on the Studd and Magnuson bills in the House and Senate, respectively, indicate that Congress is willing to unilaterally declare a 200-mile economic and fishing territorial limit in United States' waters. Henry Kissinger and others familiar with the international negotiations have pleaded with Congress to delay action, saying that the Law of the Sea Conference and the treaty it could produce are the most important international projects in centuries. Proponents of the bill, however, want protection for the fishing industry, claiming that foreign vessels are taking too much of the continental shelf fish resources. Despite the validity of this contention, it is hoped that cooler heads will prevail in Congress. Most likely, a 200-mile limit will be the result of the Conference, but unilateral American action could seriously impair future international efforts to solve world-wide problems. Also, according to several international law experts, such an action would be in contravention of several treaties to which the United States is now a signatory. (Frank-Florida)
W77-03591

CORPS' NEW LOOK IN FLOOD CONTROL: NO DAMS, LEVEES,
For primary bibliographic entry see Field 4A.
W77-03593

THE PEOPLE'S LAKE,
Save Lake Superior Association, Duluth, Minn.
For primary bibliographic entry see Field 5G.
W77-03594

THOSE NASTY PHOSPHATIC CLAY PONDS,
For primary bibliographic entry see Field 5G.
W77-03596

NORTHWEST MARICULTURE LAWS,
Oregon State Univ., Corvallis. Sea Grant Coll. Program; and Oregon State Univ., Ocean Resources Law Program.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-248 822. Price codes: A03 in paper copy, A01 in microfiche.
Northwest Mariculture Laws - Papers and Presentations from a symposium held at the Law Center, University of Oregon, Eugene, Oregon, June 7, 1974; Available from Sea Grant Communications, Oregon State Univ., Corvallis, Or. 97331, (1975). 31 p.

Descriptors: *Marine animals, *Marine fish, *Commercial fishing, *Fish farming, *Aquiculture, Aquatic productivity, Fish, Shellfish, Fish hatcheries, Fish management, Fishery, Oysters, Commercial shellfish, Shellfish farming, Legal aspects, Pacific Coast Region, Salmon, Aquatic life, Law of the Sea, International law.
Identifiers: *Mariculture, *Marine aquaculture.

Mariculture or salt water 'fish farming' has been practiced in Northwest fisheries for many years. Recent legislation in Oregon, however, has made new Pacific species available to this growing field of commercial enterprise. The proceedings of a recent symposium on mariculture laws examined the legal implications of establishing and operating a mariculture business, the relationship of Oregon shellfish (specifically oysters) to mariculture, mariculture and the international law of the sea, and the legal aspects of marine aquaculture as compared with those of ownership and use of land for agriculture. The new era of aquaculture was explored, and divergent uses of marine waters analyzed. (Cowart-Florida)
W77-03598

WATER RIGHTS,
Wisconsin Univ., Madison.
J. B. MacDonald, and J. H. Beuscher.
(2nd ed. 1973). 659 p, 6 map, 24 photo, 6 illus.

Descriptors: *Water rights, *Riparian rights, *Competing uses, *Legislation, *Legal aspects, Federal-states water rights conflicts, Equitable apportionment, Water law, Federal government, State governments, Local governments, Governmental interrelations, Administrative agency, Abatement, Water pollution control, Regulation, Zoning, Land use, Regions, Water quality control, Penalty(Legal), Judicial decisions, Law enforcement, Legal review, Pollution taxes(Charges).
Identifiers: Licenses, Administrative regulations, Water rights(Non-riparian).

This collection of materials focuses on water problem typical of the humid east. Its expanded format is due to the increased volume of legislation and litigation that has taken place nationwide. Results of research undertaken at the University of Wisconsin for the past twenty-five years are included. In addition to traditional materials on diffused surface waters, groundwater and riparian rights laws, means of firming up riparian rights are also stressed. Conflicts between riparian private rights and claims of non-riparian members of the public, particularly concerning recreational uses of water and maintenance of water quality, are given great attention. Shoreline zoning as a means of preserving water quality is considered. Attention is given to federal-state and state-state water law problems. The limitations imposed on private water use by both the state and federal governments are investigated in detail. Various aspects of water pollution abatement are reviewed including: the role of the courts; specialized administrative agencies; restrictive use of shorelines; sanctions, incentives, and charges. Scholarly writings, technical information, and court decisions are included to substantiate all issues presented. (Moorhouse-Florida)
W77-03599

THE WYOMING WATER QUALITY ACT AND THE FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972: A COMPARISON,
For primary bibliographic entry see Field 5G.
W77-03600

6F. Nonstructural Alternatives

FLOOD PLAIN INFORMATION: TUSCARAWAS AND ADJACENT TRIBUTARY AREAS, TUSCARAWAS COUNTY, OHIO.
Army Engineer District, Huntington, W. Va.
For primary bibliographic entry see Field 4A.
W77-03174

FLOOD PLAIN INFORMATION: KASKASKIA RIVER AND TRIBUTARIES, COLES COUNTY, ILLINOIS,
Army Engineer District, St. Louis, MO.
For primary bibliographic entry see Field 4A.
W77-03175

FLOOD PLAIN INFORMATION: SAN JUAN RIVER AND TRIBUTARIES, FARMINGTON, NEW MEXICO.
Army Engineer District, Sacramento, Calif.
For primary bibliographic entry see Field 4A.
W77-03176

FLOOD PLAIN INFORMATION: CONTOOCOOK RIVER AND NUBANUSIT BROOK, PETERBOROUGH, NEW HAMPSHIRE.
Army Engineer District, Waltham, Mass. New England Div.
For primary bibliographic entry see Field 4A.
W77-03177

FLOOD PLAIN INFORMATION: CHICOPEE RIVER: CHICOPEE, SPRINGFIELD, LUDLOW, WILBRAHAM AND PALMER, MA SACHUSETTS.
Army Engineer District, Waltham, Mass. New England Div.
For primary bibliographic entry see Field 4A.
W77-03178

FLOOD PLAIN INFORMATIO METROPOLITAN REGION, LINCOL NEBRASKA: VOLUME I, SUMMARY REPO SALT CREEK, HAINES BRANCH AND BE SLOUGH, SALT CREEK BASIN.
Army Engineer District, Omaha, Nebr.
For primary bibliographic entry see Field 4A.
W77-03179

FLOOD PLAIN INFORMATIO METROPOLITAN REGION, LINCO NEBRASKA, VOLUME II, SUMMARY PORT, ANTELOPE CREEK, DEAD MANS R AND MIDDLE CREEK, SALT CREEK BASIN
Army Engineer District, Omaha, Nebr.
For primary bibliographic entry see Field 4A.
W77-03180

FLOOD PLAIN INFORMATI METROPOLITAN REGION, LINCO NEBRASKA, VOLUME III, SUMMARY PORT, LITTLE SALT, OAK, SALT, STEVENS CREEK, SALT CREEK BASIN.
Army Engineer District, Omaha, Nebr.
For primary bibliographic entry see Field 4A.
W77-03181

FLOOD PLAIN INFORMATION: WILD CREEK AND KOKOMO CREEK, VICINITY KOKOMO, HOWARD COUNTY, INDIANA.
Army Engineer District, Louisville, Ky.
For primary bibliographic entry see Field 4A.
W77-03182

FLOOD PLAIN INFORMATION: SCIOTO OLENTANGY RIVERS, OHIO, COLUM AREA, SUMMARY REPORT.
Army District Engineers, Huntington, W. Va.
For primary bibliographic entry see Field 4A.
W77-03183

NATIONAL PROGRAM FOR MANAG FLOOD LOSSES: GUIDELINES FOR PREPA TION, TRANSMITTAL, AND DISTRIBUT OF FLOOD-PRONE AREA MAPS PAMPHLETS,
Geological Survey, Reston, Va. Water Reso Div.
For primary bibliographic entry see Field 7C.
W77-03341

FLOOD DISASTER PROTECTION ACT 1973,
Central and Southern Florida Flood Contro trict, West Palm Beach.
D. O. Morgan.
In Depth Report, Vol. 2, No. 5, p. 1-8 (Nov. 1974). 8 p, 1 photo, 3 chart.

Descriptors: *Flood protection, *Flood co *Flood damage, *Flood plain insurance, Le tion, Legal aspects, Flood profiles, Insu Compensation, Costs, Damages, Prote Risks, Disasters, Flood data, Flood plains, F water, Water injury, Flood forecasting, frequency, Flood plain zoning, Flooding.

As a result of a flood insurance feasibility undertaken by the Secretary of Housing Urban Development in 1966, it was deter that a national flood insurance program was ble, and could provide subsidized premium for property in high risk areas. Subsequen 1968 Congress passed the National Floo

nce Act. Improving on the shortcomings of the
Act, the Flood Disaster Protection Act of
expands the limits of insurance coverage, and
nds the emergency program for two more
s. Further, it creates incentive for flood-prone
munities to enter the program, requires in-
nce on all federal or federally-assisted financ-
of buildings in flood-prone areas, and
blishes explicit procedures for communities
ing to appeal HUD's flood elevation deter-
ations. With these measures the National
d Insurance Program will be able to provide
certainty of financial protection for anyone
decides that it may be necessary to build in
d-prone areas in the future. (Cowart-Florida)
-03522

**N FOR IMPROVEMENT OF THE DELTA
EES.**
fornia State Dept. of Water Resources, Sacra-
to.
primary bibliographic entry see Field 4A.
-03550

**RPS' NEW LOOK IN FLOOD CONTROL:
DAMS, LEVEES,**
primary bibliographic entry see Field 4A.
-03593

. Ecologic Impact Of Water Development

**IRONMENTAL IMPACT OF LAND USE ON
TER QUALITY, PROGRESS REPORT,**
n County Soil and Water Conservation Dis-
, Fort Wayne, Ind.
primary bibliographic entry see Field 5G.
-03106

**ESSMENT OF POTENTIAL INTERAC-
NS OF MICROORGANISMS AND POLLU-
TS RESULTING FROM PETROLEUM
ELOPMENT ON THE OUTER CONTINEN-
SHELF IN THE BEAUFORT SEA,**
isville Univ., Ky. Dept. of Biology.
primary bibliographic entry see Field 5C.
-03217

**ESSMENT OF POTENTIAL INTERAC-
NS OF MICROORGANISMS AND POLLU-
TS RESULTING FROM PETROLEUM
ELOPMENT ON THE OUTER CONTINEN-
SHELF IN THE GULF OF ALASKA,**
isville Univ., Ky. Dept. of Biology.
primary bibliographic entry see Field 5C.
-03218

**CE HYDROCARBON ANALYSIS IN PREVI-
LY STUDIED MATRICES AND METHODS
ELOPMENT FOR: (A) TRACE
ROCARBON ANALYSIS IN SEA ICE AND
THE SEA ICE-WATER INTERFACE, (B)
LYSIS OF INDIVIDUAL HIGH MOLECU-
WEIGHT AROMATIC HYDROCARBONS,**
onal Bureau of Standards, Washington, D. C.
e Organic Analysis Group.
primary bibliographic entry see Field 5A.
-03219

**IRONMENTAL ASSESSMENT OF
SKAN WATERS - TRACE ELEMENT
THODOLOGY - INORGANIC ELEMENTS,**
onal Bureau of Standards, Washington, D. C.
primary bibliographic entry see Field 5A.
-03220

**TRIBUTION OF LIGHT HYDROCARBONS,
C14, IN THE NORTHEAST GULF OF
ALASKA AND THE SOUTHEASTERN BERING
SHELF,**
National Oceanic and Atmospheric Administration, Seattle, Wash. Pacific Marine Environmental Lab.
For primary bibliographic entry see Field 5B.
W77-03221

NATURAL DISTRIBUTION OF TRACE HEAVY METALS AND ENVIRONMENTAL BACKGROUND IN THREE ALASKA SHELF AREAS,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 5B.
W77-03222

BASELINE STUDY OF MICROBIAL ACTIVITY IN THE BEAUFORT SEA AND GULF OF ALASKA AND ANALYSIS OF CRUDE OIL DEGRADATION BY PSYCHROPHILIC BACTERIA,
Oregon State Univ., Corvallis. Dept. of Microbiology.
For primary bibliographic entry see Field 5C.
W77-03223

HYDROCARBONS: NATURAL DISTRIBUTION AND DYNAMICS ON THE ALASKAN OUTER CONTINENTAL SHELF,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 5B.
W77-03224

MICROBIAL RELEASE OF SOLUBLE TRACE METALS FROM OIL IMPACTED SEDIMENTS,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 5C.
W77-03225

INCIDENCE OF PATHOLOGY OF MARINE FISH DISEASES IN THE GULF OF ALASKA, BERING SEA, AND BEAUFORT SEA,
California Univ., Davis.
For primary bibliographic entry see Field 5B.
W77-03226

DEVELOPMENT AND OPERATION OF HF CURRENT-MAPPING RADAR UNITS-PHYSICAL OCEANOGRAPHY,
National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
For primary bibliographic entry see Field 5B.
W77-03227

CURRENT MEASUREMENTS IN THE BEAUFORT SEA,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 2L.
W77-03228

EFFECTS OF SEASONABILITY AND VARIABILITY OF STREAMFLOW ON NEARSHORE COASTAL AREAS,
Alaska Univ., College. Inst. of Water Resources.
For primary bibliographic entry see Field 5C.
W77-03229

GULF OF ALASKA STUDY OF MESOSCALE OCEANOGRAPHIC PROCESSES (GAS-MOP),
National Oceanic and Atmospheric Administration, Seattle, Wash. Pacific Marine Environmental Lab.
S. P. Hayes, and J. D. Schumacher.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 11. Physical Oceanography and Meteorology, p 75-106, April 1976. 11 fig, 1 tab, 15 ref. R7120846 and R7120847.

Descriptors: *Alaska, *Circulation, *Ocean circulation, *Ocean currents, *Oil pollution, *Oil spills, *Resources development, *Baseline studies, *Water pollution, *Environmental effects, Meteorology, Seasonal.
Identifiers: *Outer Continental Shelf, *Physical oceanography, *Petroleum resources, Oil exploration, Oil development, Mesoscale processes, Gulf of Alaska.

The objective of this research is to describe the mesoscale oceanic circulation on the continental shelf in the Gulf of Alaska in order to characterize the intermediate scale advective and diffusive processes. These processes are inherently important to the assessment of potential pollution problems due to OCS petroleum development. To date, data collected, processed and analyzed from the Gulf of Alaska indicate the following preliminary conclusions: The mean flow is high (of order 25 cm/sec) and directed to the west generally following the local isobaths. There are considerable variations in the mean flow and in the fluctuations. The flow near Kodiak Island is larger than that measured at other shelf break locations. During winter storm-induced velocity changes are of the same order as the mean flow. These appear to be mainly barotropic and hence linearly related to the sea surface slope. During spring the velocity field is more complex. The fluctuations in the velocity do not correlate simply with the bottom pressure. It appears that nonlocal forcing may be important. The seasonal change in the density stratification is relfected in the coherence of the currents. During winter high coherence from 20 m to 100 m is observed. In the summer the coherence is lower. (Sinha-OEIS)
W77-03230

NUMERICAL STUDIES OF ALASKAN REGION,
National Oceanic and Atmospheric Administration, Seattle, Wash. Pacific Marine Environmental Lab.
For primary bibliographic entry see Field 5B.
W77-03231

BRISTOL BAY OCEANOGRAPHIC PROCESSES (B-BOP),
National Oceanic and Atmospheric Administration, Seattle, Wash. Pacific Marine Environmental Lab.
For primary bibliographic entry see Field 5B.
W77-03232

STD MAPPINGS OF THE BEAUFORT SEA SHELF,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 2L.
W77-03233

OUTER CONTINENTAL SHELF ENERGY PROGRAM,
National Oceanic and Atmospheric Administration, Miami, Fla. Atlantic Oceanographic and Meteorological Labs.
For primary bibliographic entry see Field 5B.
W77-03234

PREPARATION OF HYDRODYNAMICAL-NUMERICAL AND 3-PARAMETER SMALL-MESH ATMOSPHERIC MODELS FOR COASTAL WATERS IN THE GULF OF ALASKA,
Naval Environmental Prediction Research Facility, Monterey, Calif.
For primary bibliographic entry see Field 5B.
W77-03235

MESOSCALE CURRENTS AND WATER MASSES IN THE GULF OF ALASKA,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 5B.

W77-03236

HISTORICAL AND STATISTICAL OCEANOGRAPHIC DATA ANALYSIS AND SHIP OF OPPORTUNITY PROGRAM,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 5A.
W77-03237

TRANSPORT OF POLLUTANTS IN THE VICINITY OF PRUDHOE BAY, ALASKA,
National Environmental Research Center, Corvallis, Oreg.
For primary bibliographic entry see Field 5B.
W77-03238

MARINE CLIMATOLOGY OF THE GULF OF ALASKA AND THE BERING AND BEAUFORT SEAS,
Alaska Univ., Anchorage. Arctic Environmental Information and Data Center.
For primary bibliographic entry see Field 5B.
W77-03239

MARINE CLIMATOLOGY OF THE GULF OF ALASKA AND THE BERING AND BEAUFORT SEAS. PART III. CLIMATIC ATLASES,
Alaska Univ., Anchorage. Arctic Environmental Information and Data Center.
For primary bibliographic entry see Field 5B.
W77-03240

PHYSICAL OCEANOGRAPHY OF THE GULF OF ALASKA,
National Marine Fisheries Service, Seattle, Wash. Northwest Fisheries Center.
For primary bibliographic entry see Field 5B.
W77-03241

NEAR-SHORE ATMOSPHERIC MODIFICATION,
National Oceanic and Atmospheric Administration, Seattle, Wash. Pacific Marine Environmental Lab.
For primary bibliographic entry see Field 5B.
W77-03242

A SEISMOTECTONIC STUDY OF SEISMIC AND VOLCANIC HAZARDS IN THE PRIBILOF ISLANDS - EASTERN ALEUTIAN ISLANDS REGION OF THE BERING SEA,
Lamont-Doherty Geological Observatory, Palisades, N. Y.
For primary bibliographic entry see Field 2L.
W77-03243

COASTAL MORPHOLOGY AND SEDIMENTATION, GULF COAST OF ALASKA (GLACIAL SEDIMENTATION),
Rhode Island Univ., Kingston, Dept. of Geology.
For primary bibliographic entry see Field 5B.
W77-03244

COASTAL DYNAMICS AND SEDIMENT TRANSPORTATION, NORTHEAST GULF OF ALASKA,
South Carolina Univ., Columbia. Dept. of Geology.
For primary bibliographic entry see Field 2L.
W77-03245

THE ENVIRONMENTAL GEOLOGY AND GEOMORPHOLOGY OF THE GULF OF ALASKA COASTAL PLAIN,
Alaska Univ., College. Dept. of Geology.
For primary bibliographic entry see Field 2L.
W77-03246

DELINEATION AND ENGINEERING CHARACTERISTICS OF PERMAFROST BENEATH THE BEAUFORT SEA,
Cold Regions Research and Engineering Lab., Hanover, N. H.
For primary bibliographic entry see Field 2C.
W77-03247

DISTRIBUTION, COMPOSITION AND TRANSPORT OF SUSPENDED PARTICULATE MATTER IN THE GULF OF ALASKA AND SOUTHEASTERN BERING SHELF,
National Oceanic and Atmospheric Administration, Seattle, Wash. Pacific Marine Environmental Lab.
For primary bibliographic entry see Field 2L.
W77-03248

OFFSHORE PERMAFROST STUDIES, BEAUFORT SEA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2L.
W77-03249

MARINE ENVIRONMENTAL PROBLEMS IN THE ICE COVERED BEAUFORT SEA SHELF AND COASTAL REGIONS,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2L.
W77-03250

SURFACE CURRENT OBSERVATIONS - BEAUFORT SEA, 1972,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2L.
W77-03251

DISTRIBUTION AND CHARACTER OF ICINGS IN NORTHEASTERN ALASKA,
Geological Survey, Menlo Park. Calif.
For primary bibliographic entry see Field 2C.
W77-03252

A 'HERRING-BONE' PATTERN OF POSSIBLE TAYLOR-GORTER-TYPE FLOW ORIGIN SEEN IN SONOGRAPHS,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 5B.
W77-03253

HEAVY-MINERAL TRENDS IN THE BEAUFORT SEA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2L.
W77-03254

YUKON DELTA COASTAL PROCESSES STUDY,
Wesleyan Univ., Middletown, Conn. Dept. of Earth and Environmental Sciences.
For primary bibliographic entry see Field 2L.
W77-03255

FAULT HISTORY OF THE PRIBILOF ISLAND AND ITS RELEVANCE TO BOTTOM STABILITY IN THE ST. GEORGE BASIN,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2L.
W77-03256

EARTHQUAKE ACTIVITY AND GROUND SHAKING IN AND ALONG THE EASTERN GULF OF ALASKA,
Geological Survey, Menlo Park, Calif. Office of Earthquake Studies.
For primary bibliographic entry see Field 2L.
W77-03257

EROSION AND DEPOSITION OF SHELF SE MENT: EASTERN GULF OF ALASKA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2L.
W77-03258

FAULTING AND INSTABILITY OF SHE SEDIMENTS: EASTERN GULF OF ALASKA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2L.
W77-03259

SEISMIC AND VOLCANIC RISK STUDIE WESTERN GULF OF ALASKA,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 2L.
W77-03260

OFFSHORE PERMAFROST-DRILLING, BOU DARY CONDITIONS, PROPERTI PROCESSES AND MODELS,
Alaska, Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 5B.
W77-03261

BEAUFORT SEACOAST PERMAFROST S DIES,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 2C.
W77-03262

BENTHOS-SEDIMENTARY SUBSTRATE TERACTIONS,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 5C.
W77-03263

FAULTING AND INSTABILITY OF SH SEDIMENTS - WESTERN GULF OF ALASK
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2L.
W77-03264

A STUDY OF BEAUFORT SEA COASTAL E SION - NORTHERN ALASKA,
For primary bibliographic entry see Field 2L.
W77-03266

THE INTERACTION OF OIL WITH SEA IC THE ARCTIC OCEAN,
Washington Univ., Seattle. Dept. of Ocea raphy.
For primary bibliographic entry see Field 5C.
W77-03267

STUDY OF CLIMATIC EFFECTS ON FAST EXTENT AND ITS SEASONAL DECAY AL THE BEAUFORT SEA COAST,
Colorado Univ., Boulder. Inst. of Arctic and pine Research.
For primary bibliographic entry see Field 2C.
W77-03270

MECHANICS OF ORIGIN OF PRESS RIDGES, SHEAR RIDGES AND HUMM FIELDS IN LANDFAST ICE,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 2L.
W77-03271

EXPERIMENTAL MEASUREMENTS OF ICE FAILURE STRESSES NEAR GROUN STRUCTURES,
Alaska Univ., College. OCS Coordination Offi
For primary bibliographic entry see Field 2C.
W77-03274

UFORT SEA, CHUKCHI SEA, BERING AIT HISTORICAL BASELINE ICE STUDY,
ka Univ., College. Dept. of History.
primary bibliographic entry see Field 2C.
-03275

IRONMENTAL INVENTORY AND ASSESS-T OF NAVIGATION POOLS 24, 25, AND UPPER MISSISSIPPI AND LOWER IL-OIS RIVERS; AN ELECTROFISHING SUR-OF THE ILLINOIS RIVER,
is Natural History Survey, Havana. River arch Lab.
primary bibliographic entry see Field 8I.
-03302

ROLOGY AND ENVIRONMENTAL ECTS OF ERIE CANAL (1817-99),
ogical Survey, Reston, Va. Water Resources

primary bibliographic entry see Field 8B.
-03334

ATEAGUE ECOLOGICAL STUDIES.
land Univ., Solomons. Natural Resources

primary bibliographic entry see Field 5C.
-03381

HO ENVIRONMENTAL OVERVIEW,
sulting Engineers, Inc., Boise, Idaho.
Montgomery.
ember 1975. 261 p. 106 fig., 240 ref, append.

criptors: *Census, *Idaho, Data collections, er resources, Land resources, Environmental cts, Air pollution, Water pollution, Water ity, Wildlife, Fish, Land use, Planning.
tifiers: Panhandle basin(Id), Clearwater-Sal- basin(Id), Southwest basin(Id), Upper Snake n(Id), Bear River basin(Id).

nventory of available data and evaluations of ing and potential environmental conditions is ided for use by state agencies involved in ning, administration, resource management, research. The inventory is divided into five r sections each of which covers one of the hydrologic basins in the state, the Panhandle, rwater-Salmon, Southwest Idaho, Upper e, and Bear River. Air quality, aquatic at, land use concerns such as flood hazard s, critical soil and slope, geothermal areas, quake zones, deteriorated range or forest itions, mining impact areas, second home ivisions, accelerated change, and solid waste sal sites, water quality, wildlife, and out-ding areas such as rare plants, wildlands, s and lakes, and scenic, natural or recrea-l areas within each of these five basins are narized in a catalog style presentation cross-renced to area maps. A bibliography broken by hydrologic basins is also included, as are or organizations and related programs.
dtke-Wisconsin)
-03557

ERIMENTAL ECOLOGY OF SELECTED TEBRATE SPECIES,
burgh Univ., Pa.
Hartman.
lable from the National Technical Informa-Service, Springfield, VA 22161 as COO-3426-Price codes: A03 in paper copy, A01 in ofiche. Progress Report COO-3426-13, July 31 p, 367 ref. AT(11-1)3426.

criptors: *Bibliographies, *Forests, *Small als(Mammals), *Trees, Coniferous trees, duous trees, Shrubs, Wildlife, Rodents, Deer, s.
tifiers: *Mast production, *Seeds, Pine cones, ns.

The following papers have been prepared under contract COO-3426: 'The effects of tow-clipping on the survivorship of free-ranging eastern chipmunks' by D.L. Graybill, et al.; 'Seasonal and annual variations in the quantities of nitrogen, potassium phosphorus, magnesium, calcium, and manganese reaching the forest floow as mast in Pennsylvania and Vermont forests' by D.L. Graybill, et al.; 'The effects of season, sex, and cage size on the ingestion, respiration, and body weight of captive eastern chipmunks' by D.L. Graybill; 'Factors affecting home range, and range length of the eastern chipmunk, Tamias striatus, in northwestern Pennsylvania' by G.G. West; 'Effect of sublethal exposure to gamma radiation on range parameters in the eastern chipmunk, Tamias striatus' by D.P. Snyder, et al.; 'Bibliography of Mast Production' by D.L. Graybill and D.P. Snyder. The latter contains 362 listings, updated to December 1974, and represents research conducted on seed production in forest ecosystems. Although the emphasis is on United States' conifers, secondary emphasis is on oaks, followed by deciduous trees, fruit trees and shrubs. Research from Scandinavia, the United Kingdom, Canada, New Zealand, Europe, Japan, India, USSR, Puerto Rico, Mozambique and Turkey is represented. The nutritive properties of seeds for mammals and birds, seed production, seed crops, management and collection procedures are discussed, as are commercial utilization of nutshells and fruit pits, climatic effects and other aspects of mast production. (Auen-Wisconsin)
W77-03564

ENVIRONMENTAL STATUS OF THE LAKE MICHIGAN REGION. VOL. 17. INLAND FISHES OF THE LAKE MICHIGAN DRAINAGE BASIN,
Argonne National Lab., Ill.
G. C. Becker.
Report No. ANL/ES-40, Vol. 17, September 1976. 237 p. 111 fig., 1 tab., 295 ref. ERDA W-31-109-Eng-38.

Descriptors: *Watersheds(Basins), *Lake Michigan, *Fishes, *Varieties, *Distribution, Habitats, Spawning, Limiting factors, Value, Aethetics, Bibliographies, Thermal pollution, Water pollution effects, Michigan, Wisconsin, Indiana, Illinois, Streams, Lakes, Sport fish, Commercial fish.

The distribution of fishes, by family and species, in the streams and lakes of Michigan, Wisconsin, Indiana and Illinois is presented. One-hundred thirty-eight species are found within the Lake Michigan Basin and each species range and abundance, its habitat preferences, spawning requirements (temperature, substrate, water velocity, hatching temperatures, developmental period), feeding habits, and adult size, and temperature, oxygen and pH tolerance are indicated. Information is given as to their commercial value, palatability, demand as sport fish, bait, prey species and/or pet, supplemented by comments on their status, i.e., exterminated, threatened, or prolific, and management procedures, particularly where the status is rare or threatened. Species erroneously reported in this basin and those which did not survive transplantation, did not propagate, or otherwise establish successful populations are briefly treated in a separate section. A bibliography of publications dealing with the effects of thermal and chemical pollutants on fishes as well as species distribution maps are given. (Auen-Wisconsin)
W77-03566

A CLOSER LOOK AT SOME ISSUES FOR GENERA-OCEANS POLICY, MARINE ENVIRONMENT, AND FISHERIES,
Columbia Univ., New York. School of Law.
For primary bibliographic entry see Field 6E.
W77-03585

ENVIRONMENTAL CONCERN AS A FACTOR IN COASTAL ZONE DEVELOPMENT: A STUDY OF LOUISIANA CITIZENS,
Louisiana State Univ., Baton Rouge. Dept. of Rural Sociology Research.
T. K. Pinhey, and K. W. Paterson.
Coastal Zone Management Journal, Vol 2, No 3, p 297-310 (1976). 14 p, 5 tab, 17 ref.

Descriptors: *Coastal plains, *Psychological aspects, *Louisiana, *Surveys, *Environmental effects, Environment, Coasts, Shores, Shore protection, Attitudes, Decision making, Social aspects, Motivation, Social impact, Social needs, Social participation, Investigations, Evaluation, Data collections.
Identifiers: *Coastal zone management, *Coastal Zone Management Act of 1972(CZMA).

State agencies in charge of implementing the Coastal Zone Management Act of 1972 have perforce become increasingly interested in the views and attitudes of those subject to their rulings. In Louisiana, a statewide sample survey was made which was designed to measure public knowledge of and attitudes toward environmental issues. It was designed to add to previous literature on the subject, which substantiated the theory that the environmental movement is essentially an upper middle class social phenomenon associated with high education, high income, and urban residence. The survey contained 32 questions, used 20 interviewers, and was done with a sample of 926 residents of the state. The results showed that: (1) most people were unaware of current planning efforts; (2) most people felt that the coastal natural environment was valuable and worth protecting; (3) most people felt that the environment of the coastal zone would improve in the future; and (4) blacks were more concerned with natural disasters, while whites worried more about environmental problems. (Frank-Florida)
W77-03590

7. RESOURCES DATA

7B. Data Acquisition

ELECTRONIC SENSOR FOR LOW-TO-MEDIUM WINDSPEEDS,
Agricultural Research Service, Yakima, Wash.
P. A. Boving.
Agricultural Engineering, Vol. 57, No. 3, p 20, March 1976. 2 fig, 2 ref.

Descriptors: *Instrumentation, *Winds, *Anemometers, Agriculture, Micrometeorology, Velocity, Flow measurement, Bridges(Electric), Weather, Weather data, Sprays.
Identifiers: *Thermistors, *Windspeed sensors, Cup anemometer, Bridge circuit.

A low speed anemometer which uses thermistors as the sensor and in the measuring circuit was described. The bridge circuit operates on 8 volts with an input voltage from 10.5 to 24 volts d-c. The output of the bridge was designed to match the input requirements of an analog recorder also used to record other meteorological signals. The output was found to be accurate to + or - 0.1 mph from 0 to 12 mph. (Jones-ISWS)
W77-03099

RADIO-ECHO LAYERS AND THE RECENT STABILITY OF THE WEST ANTARCTIC ICE SHEET,
Ohio State Univ. Research Foundation, Columbus. Inst. of Polar Studies and Ohio State Univ., Columbus. Dept. of Geology and Mineralogy.
For primary bibliographic entry see Field 2C.
W77-03100

A REVIEW OF HAIL-MEASURING INSTRUMENTS,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 2B.
W77-03101

RETRANSMISSION OF HYDROMETRIC DATA IN CANADA,
Department of the Environment, Ottawa (Ontario). Applied Hydrology Div.
R. A. Halliday.
Type I Report, SR 28190, October 1975. 9 p, 1 fig, 1 tab.

Descriptors: *Hydrologic data, *Flood forecasting, *Canada, Inflow, *Data collections, Meteorological data, Satellites(Artificial), Water levels, Projects, *Data transmission, Remote sensing.
Identifiers: *Hydrometric data, *Retransmission, Data collection platforms, Test site, Landsat, Solar panel.

Thirteen Data Collection Platforms, nine GE and four Ball Brothers Research Corporation (BBRC) Convertible Data Collection Platforms model CDCP-100 (CDCP), transmitted hydrometric and meteorological data from remote hydrometric stations within Canada's mainland to Landsat 2. The system met requirements, and the suitability of retransmission by satellite had been demonstrated. Several CDCPs had been checked out at a site on the Bow River below Carseland Dam near Calgary, Alberta. Experiments using one BBRC CDCP were made in the GOES mode, but they were unsuccessful. On the basis of these results, it was apparent that retransmission by satellite is an excellent method of obtaining data from isolated areas. In vast regions of Canada, it is the only way to obtain data on a near real time basis. (Roberts-ISWS)
W77-03111

COMPUTATION OF THE POTENTIAL EVAPOTRANSPIRATION AND THEIR COMPARISON WITH VALUES OF THE ACTUAL EVAPOTRANSPIRATION OF LYSIMETERS, (IN GERMAN),
Ag armeteorologische Forschungsanstalt, Brunswick (West Germany).
For primary bibliographic entry see Field 2D.
W77-03118

DISTRIBUTION AND CHARACTER OF ICINGS IN NORTHEASTERN ALASKA,
Geological Survey, Menlo Park. Calif.
For primary bibliographic entry see Field 2C.
W77-03252

A 'HERRING-BONE' PATTERN OF POSSIBLE TAYLOR-GORTER-TYPE FLOW ORIGIN SEEN IN SONOGRAPHS,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 5B.
W77-03253

MORPHOLOGY OF BERING NEAR SHORE ICE CONDITIONS BY MEANS OF SATELLITE AND AERIAL REMOTE SENSING,
Alaska Univ., College. OCS Coordination Office.
For primary bibliographic entry see Field 2C.
W77-03272

MORPHOLOGY OF BEAUFORT NEAR SHORE ICE CONDITIONS BY MEANS OF SATELLITE AND AERIAL REMOTE SENSING,
Alaska Univ., College. OCS Coordination Office.
For primary bibliographic entry see Field 2C.
W77-03273

DEVELOPMENT OF HARDWARE AND PROCEDURES FOR IN-SITU MEASUREMENT OF CREEP IN SEA ICE,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 2C.
W77-03276

OPERATION OF AN ALASKAN FACILITY FOR APPLICATIONS OF REMOTE-SENSING DATA TO OCS STUDIES,
Alaska Univ., College. Geophysical Inst.
A. E. Belon.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 14. Ice, p 409-456, April 1976. 14 fig, 2 tab, 6 ref, append. 03-5-022-55.

Descriptors: *Alaska, *Sea ice, *Remote sensing, *Sediment transport, *Baseline studies, *Resources development, *Water pollution, *Oil spills, *Oil pollution, Data collections, Navigation.
Identifiers: *Outer Continental Shelf, Petroleum resources, Oil exploration, Oil development, *Fast ice, Suspended sediments.

The primary objective of the project was to assemble available remote-sensing data of the Alaskan outer continental shelf and to assist OCS investigators in the analysis and interpretation of these data to provide a comprehensive assessment of the development and decay of fast ice, sediment plumes and offshore suspended sediment patterns along the Alaskan coast from Yakutat to Demarcation Bay. The acquisition of remote-sensing data, especially satellite data, has proved to be a cost-effective method of monitoring the environment on a synoptic scale. The morphology and dynamics of sea-ice which are relevant to navigation and construction of offshore structures, the patterns of sediment transport and sea-surface circulation which will aid to forecast trajectories of potential oil spills and impact on fisheries, the nature of ecosystems in the near-shore regions which can be changed by human activity, are among the critical development-related environmental parameters which can be studied, in conjunction with appropriate field measurements, and eventually routinely monitored by remote-sensing. The demonstration projects have shown that LANDSAT data can be used effectively for developing models of suspended transport and therefore for preparing contingency plans based on the movement of oil spills in Alaskan coastal waters, for planning navigation routes and offshore drilling structures in coastal areas where sea-ice is prevalent, and for assessing the potential physical and biological impact of developmental activities on the coastal zone. (Sinha-OEIS)
W77-03277

COMPUTER MAPPING OF WATER QUALITY IN SAGINAW BAY WITH LANDSAT DIGITAL DATA,
Bendix Aerospace Systems Div., Ann Arbor, Mich.
For primary bibliographic entry see Field 5A.
W77-03305

MEASUREMENT OF NONEXCHANGING PORES DURING MISCIBLE DISPLACEMENT IN SOILS,
Massachusetts Agricultural Experiment Station, Amherst.
For primary bibliographic entry see Field 2G.
W77-03320

CALIBRATION OF NEUTRON PROBE IN SOME SELECTED HAWAIIAN SOILS,
Hawaiian Sugar Planter' Association Experiment Station, Honolulu.
For primary bibliographic entry see Field 2G.
W77-03321

A CINE-CAMERA TECHNIQUE FOR PROCE
MEASUREMENT ON A RIDGE AND RUNN
BEACH,
Reading Univ. (England). Dept. of Geology; a
Reading Univ. (England). Sedimentolo
Research Lab.
For primary bibliographic entry see Field 2L.
W77-03325

MEASUREMENT OF 'TURBIDITY' AND R
LATED CHARACTERISTICS OF NATUR
WATERS,
Geological Survey, Reston, Va. Water Resour
Div.
R. J. Pickering.
Open-file report 76-153, January 1976. 7 p, 65 r
append.

Descriptors: *Turbidity, *Optical properti
*Light penetration, *Surface waters, Measu
ment, Methodology, Standards, Suspended soli
Water quality.

The U.S. Geological Survey, Water Resour
Division has adopted the following principles to
used in selecting methods for the measurement
light transmitting characteristics of natural wat
(1) standard instruments and methods are to
adopted to measure and report in optical un
avoiding 'turbidity' as a quantitative measure;
reporting of 'turbidity' in JTU's, Hellige un
severity, or NTU's will be phased out; (3) the ba
for estimations of sediment concentrations ba
on light measurements must be documen
adequately; and (4) use of transparency measu
ment by Secchi disk is not changed, although li
transmittance may prove to be more precise me
of obtaining the same information. A schedule
been established to implement new meth
beginning October 1, 1976, and with the transit
to be completed at all stations by October 1, 19
Provisions are provided to meet requirements
cooperators who have legal requirements
'turbidity' data. (Woodard-USGS)
W77-03339

HIGH-RESOLUTION SEISMIC REFLECTI
PROFILING FOR MAPPING SHALL
AQUIFERS IN LEE COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla. Wa
Resources Div.
T. M. Missimer, and R. A. Gardner.
Available from the National Technical Infor
tion Service, Springfield, VA 22161 as PB-
414/As. Price codes: A03 in paper copy, A0
microfiche. Water Resources Investigation 76
July 1976. 30 p, 14 fig, 1 tab, 9 ref.

Descriptors: *Geologic mapping, *Aquif
*Sedimentary structures, *Seismic stud
*Florida, Methodology, Hydrogeol
Folds(Geologic), Groundwater, Surface waters
Identifiers: Lee County(Fla), *Shallow aquif
Hawthorn Formation(Fla), Tamiami For
tion(Fla), Caloosahatchee River(Fla), San Ca
Bay(Fla).

High-resolution continuous seismic reflec
profiling equipment was utilized to define the c
figuration of sedimentary layers underlying pa
Lee County, Florida. About 45 miles (72 kilo
ters) of profile were made on the Caloosahatc
River Estuary and San Carlos Bay. Two differ
acoustic energy sources, a high resolution boo
and a 45-electrode high resolution sparker, b
having a power input of 300 joules, were use
obtain both adequate penetration and good res
tion. The seismic profiles show that much of
strata of middle Miocene to Holocene age
parently are extensively folded but not faulted
itial interpretations indicate that: (1) the top of
Hawthorn Formation (which contains the u
Hawthorn aquifer) has much relief due chiefl
apparent folding; (2) the limestone, sandstone,
unconsolidated sand and phosphorite, wh
together compose the sandstone aquifer, appea

U. OF I. URBANA-CHAMP

iscontinuous; (3) the green clay unit of the iami Formation contains large scale angular dipping eastward; and (4) numerous deep alluvium-filled paleochannels underlie the osahatchee River. (Woodard-USGS)
-03344

THODS OF DISSOLED OXYGEN BUDGET LYSIS FOR ASSESSING EFFECTS OF DGED MATERIAL DISPOSAL ON LOGICAL COMMUNITY METABOLISM,
inia Univ., Charlottesville, Va.
primary bibliographic entry see Field 5C.
-03393

OF INTRINSICALLY SAFE INSTRUMEN-ION.
primary bibliographic entry see Field 5A.
-03462

EW METHOD OF AUTOMATIC DETER-ATION OF NITRATE IN WASTE WATERS POLLUTED SURFACE WATERS (EIN ES VERFAHREN ZUR AUTOMATISCHEN RAT-BESTIMMUNG IN ABWAESSERN BELASTETEN OBERFLAECHENWAES-N),
primary bibliographic entry see Field 5A.
-03466

OMATION: A SHORT HISTORY, BUT A G FUTURE,
ley and Hansen, Philadelphia, Pa.
primary bibliographic entry see Field 5D.
-03469

AERIAL PHOTO-WATER QUALITY K.
primary bibliographic entry see Field 5A.
-03471

Evaluation, Processing and Publication

RELATION ANALYSIS OF ROMETEOROLOGICAL DATA,
ral and Southern Florida Flood Control Dis-West Palm Beach. Environmental Engineer-

primary bibliographic entry see Field 2A.
-03086

ROLOGIC ENGINEERING METHODS WATER RESOURCES DEVELOPMENT, UME 5, HYPOTHETICAL FLOODS,
rologic Engineering Center, Davis, Calif.
primary bibliographic entry see Field 8B.
-03104

ROLOGIC ENGINEERING METHODS WATER RESOURCES DEVELOPMENT, UME 6, WATER SURFACE PROFILES,
rologic Engineering Center, Davis, Calif.
primary bibliographic entry see Field 8B.
-03105

HREE-DIMENSIONAL FINITE ELEMENT OUND WATER MODEL,
ornia Univ., Davis. Water Science and En-ering Section.
primary bibliographic entry see Field 2F.
-03109

TE AND COUNTY AREA TABULATIONS THE COLORADO RIVER BASIN,
ic Health Service, Denver, Colo. Div. of r Supply and Pollution Control.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-245 734, Price codes: A02 in paper copy, A01 in microfiche. January 1962. 21 p, 1 map, 5 tab.

Descriptors: *Drainage area, *Watersheds(Basins), *Colorado River Basin, *Colorado River, Drainage, River basins, Rivers, Interstate rivers, Mapping, *Data collections.
Identifiers: States(Tabulations), Counties(Tabulations).

This report provided drainage area determinations which have been adopted as standard basic data for use in the Colorado River Basin Water Quality Control Project. A check of available data of this type prepared by various public and private agencies revealed slight variations among the various sources. The data contained in this report were developed, therefore, to avoid confusion that might arise if a standard set of these data were not specified for use in this project. Measurements of the drainage area were obtained with a planimeter on the most recent maps available. For the most part, the national topographic series of quadrangle maps of the United States Geological Survey, on a scale of 1:62,500, were used for this purpose. In some instances, maps with a scale of up to 1:250,000 were the best available and were consequently used, although it is recognized that the degree of accuracy in those instances is less than would be desirable. (Sims-ISWS)
W77-03110

RETRANSMISSION OF HYDROMETRIC DATA IN CANADA,
Department of the Environment, Ottawa (Ontario). Applied Hydrology Div.
For primary bibliographic entry see Field 7B.
W77-03111

OPTRM - A HYDROLOGIC TRANSPORT MODEL WITH PARAMETER OPTIMIZATION,
Oak Ridge National Lab. Tenn.
For primary bibliographic entry see Field 5B.
W77-03115

SEASONAL DEMARCATION IN PENNSYLVANIA FOR HYDROLOGICAL USE,
Massey Univ., Palmerston North (New Zealand). Dept. of Geography.
For primary bibliographic entry see Field 2B.
W77-03127

FIELD MONITORING TECHNIQUES AND DATA ANALYSIS,
North Carolina Univ. at Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 5A.
W77-03150

FLOOD PLAIN INFORMATION: TUSCARAWAS AND ADJACENT TRIBUTARY AREAS, TUSCARAWAS COUNTY, OHIO.
Army Engineer District, Huntington, W. Va.
For primary bibliographic entry see Field 4A.
W77-03174

FLOOD PLAIN INFORMATION: KASKASKIA RIVER AND TRIBUTARIES, COLES COUNTY, ILLINOIS,
Army Engineer District, St. Louis, MO.
For primary bibliographic entry see Field 4A.
W77-03175

FLOOD PLAIN INFORMATION: SAN JUAN RIVER AND TRIBUTARIES, FARMINGTON, NEW MEXICO.
Army Engineer District, Sacramento, Calif.
For primary bibliographic entry see Field 4A.
W77-03176

FLOOD PLAIN INFORMATION: CONTOOCOOK RIVER AND NUBANUSIT BROOK, PETERBOROUGH, NEW HAMPSHIRE.
Army Engineer District, Waltham, Mass. New England Div.
For primary bibliographic entry see Field 4A.
W77-03177

FLOOD PLAIN INFORMATION: CHICOPEE RIVER: CHICOPEE, SPRINGFIELD, LUDLOW, WILBRAHAM AND PALMER, MASSACHUSETTS.
Army Engineer District, Waltham, Mass. New England Div.
For primary bibliographic entry see Field 4A.
W77-03178

FLOOD PLAIN INFORMATION: METROPOLITAN REGION, LINCOLN, NEBRASKA: VOLUME I, SUMMARY REPORT; SALT CREEK, HAINES BRANCH AND BEAL SLOUGH, SALT CREEK BASIN.
Army Engineer District, Omaha, Nebr.
For primary bibliographic entry see Field 4A.
W77-03179

FLOOD PLAIN INFORMATION: METROPOLITAN REGION, LINCOLN, NEBRASKA, VOLUME II, SUMMARY REPORT, ANTELOPE CREEK, DEAD MANS RUN, AND MIDDLE CREEK, SALT CREEK BASIN.
Army Engineer District, Omaha, Nebr.
For primary bibliographic entry see Field 4A.
W77-03180

FLOOD PLAIN INFORMATION: METROPOLITAN REGION, LINCOLN, NEBRASKA, VOLUME III, SUMMARY REPORT, LITTLE SALT, OAK, SALT, AND STEVENS CREEK, SALT CREEK BASIN.
Army Engineer District, Omaha, Nebr.
For primary bibliographic entry see Field 4A.
W77-03181

FLOOD PLAIN INFORMATION: WILDCAT CREEK AND KOKOMO CREEK, VICINITY OF KOKOMO, HOWARD COUNTY, INDIANA.
Army Engineer District, Louisville, Ky.
For primary bibliographic entry see Field 4A.
W77-03182

FLOOD PLAIN INFORMATION: SCIOTO AND OLENTANGY RIVERS, OHIO, COLUMBUS AREA, SUMMARY REPORT.
Army District Engineers, Huntington, W. Va.
For primary bibliographic entry see Field 4A.
W77-03183

DEVELOPMENT AND OPERATION OF HF CURRENT-MAPPING RADAR UNITS-PHYSICAL OCEANOGRAPHY,
National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
For primary bibliographic entry see Field 5B.
W77-03227

STD MAPPINGS OF THE BEAUFORT SEA SHELF,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 2L.
W77-03233

A HISTORICAL SUMMARY OF EARTHQUAKE EPICENTERS IN AND NEAR ALASKA,
National Geophysical and Solar-Terrestrial Data Center, Boulder, Colo.
H. Meyers.

In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1976, Vol 13. Geology, p 341-416, April 1976. 6 fig, 6 tab, 13 ref, 7 append. Also as NOAA Technical Memorandum EDS NGSDC-1.

Descriptors: *Alaska, *Earthquakes, *Hazards, *Resources development, *Environmental effects, *Baseline studies, Oil pollution, Water pollution, *Data collections.
Identifiers: *Outer Continental Shelf, Oil exploration, Oil development, Petroleum resources, *Gulf of Alaska, Epicenters.

This publication summarizes the Alaska earthquake data file as presently developed by the National Geophysical and Solar-Terrestrial Data Center (NGSDC). This is a growing file and additional data are being added both for current and historical earthquakes as they are prepared for machine processing. It describes data formats, sources used in developing the data file, and data limitations. Included are several tables which summarize the data in usable forms. The publication also is designed to accompany magnetic tapes, microfilm, and printouts produced from the data file. The data file contains information on earthquakes, known or suspected explosions, and other earth disturbances for the period 1786 through 1974. The file includes for each event the date, origin time, geographic location, focal depth, and magnitude when available. (Sinha-OEIS)
W77-03265

DYNAMICS OF NEAR-SHORE ICE (DATA BUOYS),
Washington Univ., Seattle. Dept. of Atmospheric Sciences.
For primary bibliographic entry see Field 2C.
W77-03269

BEAUFORT SEA, CHUKCHI SEA, BERING STRAIT HISTORICAL BASELINE ICE STUDY,
Alaska Univ., College. Dept. of History.
For primary bibliographic entry see Field 2C.
W77-03275

COMPUTER PROGRAMS FOR SEDIMENT TRANSPORT, DOCUMENTATION AND LISTING,
Colorado State Univ., Fort Collins. Engineering Research Center.
For primary bibliographic entry see Field 2J.
W77-03298

SALINITY INDUCED HORIZONTAL ESTUARINE CIRCULATION,
Texas A and M Univ., College Station, Dept. of Oceanography.
For primary bibliographic entry see Field 2L.
W77-03312

LOW FLOW MODELING IN SMALL STEEP WATERSHEDS,
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 4D.
W77-03316

WET AND DRY PERIODS OF ANNUAL FLOW SERIES,
Technical Univ. of Istanbul (Turkey). Dept. of Hydraulic and Water Power; and Technical Univ. of Istanbul (Turkey). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W77-03319

SEASONAL VARIATION OF RESIDUAL DRIFT IN LONG ISLAND SOUND,
Connecticut Univ., Groton. Marine Sciences Inst.
For primary bibliographic entry see Field 2L.
W77-03322

MEASURED AND SIMULATED GROUND-WATER LEVELS IN THE FRANKLIN AREA, SOUTHEASTERN VIRGINIA,
Geological Survey, Albany, N. Y. Water Resources Div.
O. J. Cosner.
Water-Resources Investigations 76-83 (open-file report), 1976. 5 sheets, 3 ref.

Descriptors: *Groundwater resources, *Model studies, *Aquifer characteristics, *Water levels, *Potentiometric level, Computer models, Synoptic analysis, *Maps, Evaluation, Hydrologic data, *Virginia, Coastal plains.
Identifiers: Franklin area(Va).

The Lower Cretaceous aquifer is the principal source of water in Southeastern Virginia. Synoptic water-level measurements made since 1970 have been used to verify a digital model of the aquifer. Measurements made in December 1973, August and December 1974 were used to further verify the model, using updated pumpage for those periods. The close agreement of the potentiometric maps based on measured and simulated water levels indicates that the model is simulating hydrologic conditions satisfactorily. (Woodard-USGS)
W77-03326

MAPS SHOWING GROUND-WATER CONDITIONS IN THE SAN SIMON AREA, COCHISE AND GRAHAM COUNTIES, ARIZONA, AND IN HIDALGO COUNTY, NEW MEXICO--1975,
Geological Survey, Tucson, Ariz. Water Resources Div.
R. P. Wilson, and N. D. White.
Water-Resources Investigations 76-89 (open-file report), July 1976. 2 sheets, 6 ref.

Descriptors: *Water wells, *Groundwater, *Water levels, *Pumping, *Water quality, *Arizona, *New Mexico, *Maps, Sites, Hydrologic data, Hydrographs, Water level fluctuations, Specific conductivity, Fluorides.
Identifiers: *San Simon area(Ariz), Cochise County(Ariz), Graham County(Ariz), Hidalgo County(N Mex).

Arizona is divided into 67 ground-water areas, and individual areas are selected for intensive data collection once every 6 years. The data collected in the San Simon area are given on maps that show depth to water, well depth, and altitude of the water level, 1975; pumpage, 1915-74; and change in water level for 1964-75, hydrographs of the water level in selected wells, specific conductance, and fluoride concentration. Scale 1:125,000. (Woodard-USGS)
W77-03327

MAPS SHOWING GROUND-WATER CONDITIONS IN THE SAN BERNARDINO VALLEY AREA COCHISE COUNTY, ARIZONA--1975,
Geological Survey, Tucson, Ariz. Water Resources Div.
R. P. Wilson.
Water-Resources Investigations 76-81 (open-file report), July 1976. 2 sheets, 2 ref.

Descriptors: *Water wells, *Groundwater, *Water levels, *Water quality, *Arizona, *Maps, Sites, Dissolved solids, Fluorides.
Identifiers: *San Bernardino Valley area(Ariz), Cochise County(Ariz).

Arizona is divided into 67 ground-water areas, and individual areas are selected for intensive data collection once every 6 years. The data collected in the San Bernardino Valley area are given on maps that show depth to water, well depth, and altitude of the water level; and dissolved-solids and fluoride concentrations, 1974. Scale 1:125,000. (Woodard-USGS)
W77-03328

GROUND-WATER LEVELS IN NEW MEXIC 1975,
Geological Survey, Albuquerque, N. Mex. Wa Resources Div.
J. D. Hudson.
New Mexico, State Engineer Office, Santa F Basic Data Report, 1976. 128 p, 33 fig, 56 tab, 3 ref.

Descriptors: *Groundwater resourc *Observation wells, *Water level fluctuatio *Water utilization, *New Mexico, Hydrolo data, Basic data collections, Aquifers, Bibliog phies, Groundwater, Publications.

Water levels in New Mexico are measured perio cally in a network of about 1,600 observation w to record changes in ground-water storage. T areas of water-level observation are within sev of the nine major surface-water drainage basi most are in areas where ground water is used large quantities for irrigation, municipal, or ind trial purposes. Measurements tabulated w made in January, February, or March 1976 reflect water-level changes during 1975 when co pared with measurements in January or Febru 1975. Water-level chages indicate a rise in 6 ar and a decline in 21 areas of ground water-le monitoring in New Mexico during 1975. The m significant average rises occurred in the Gra Bluewater area (+0.83 ft), the Sunshine Val area (+0.38 ft) and in the Playas basin (+0.19 The largest average declines occurred in Cu County (-3.29 ft), the Carlsbad area (-2.87 ft), the Northern High Plains (-1.59 ft). Water leve when averaged for 27 areas of the State, indicat decline of 0.88 ft. No large changes in irriga acreage were noted in the State in 1975. A bibli raphy of more than 300 papers and publicati pertaining to ground water in New Mex published or released to the open file in 1975, w additions from 1886-74 is included. (Wooda USGS)
W77-03330

GROUND-WATER QUALITY DATA F GEORGIA,
Geological Survey, Doraville, Ga. Wa Resources Div.
R. G. Grantham, and W. R. Stokes.
Geological Survey report, 1976. 216 p, 4 fig, 4 t 13 ref. (Prepared in cooperation with the Geo Department of Natural Resources, Atla Geologic and Water Resources Division.).

Descriptors: *Groundwater resour *Groundwater availability, *Water qual *Aquifers, *Georgia, Data collections, Wa wells, Sampling, Chemical analysis.

Ground water is found in all the physiograp provinces of Georgia. The Coastal Plain of Ge gia has the most abundant supply, while remainder of the State has supplies in vary amounts depending upon subsurface rock ty Georgia ground waters generally have consis chemical quality and usually require little or chemical treatment. Because of the increased of ground water and its importance to the w being of the citizens of Georgia, the Georgia partment of Natural Resources has funded preparation of this report by the U.S. Geolog Survey. The report is a compilation of U Geological Survey ground-water-quality data lected from 1938 to 1971. The water samples h been analyzed by U.S. Geological Survey regi laboratories. The samples are from wells for wh the location, casing depth, and total depth coul verified. (Woodard-USGS)
W77-03333

NATIONAL PROGRAM FOR MANAGI FLOOD LOSSES: GUIDELINES FOR PREPA TION, TRANSMITTAL, AND DISTRIBUT

FLOOD-PRONE AREA MAPS AND MPHLETS,
ological Survey, Reston, Va. Water Resources
W. Edelen, Jr.
en-file report, 1973, revised 1976. 30 p, 1 fig, 4

scriptors: *Flood plains, *Mapping, *United tes, Methodology, Federal project policy, ods, Flood plain insurance, *Maps.
ntifiers: *Flood-prone area maps, Preparation delines, Mapping techniques.

formation is presented to assist in preparing od-prone area maps and pamphlets. ckground and history of the program, legal thority, analytical techniques, printing, distribun, and other operational details are discussed. use Document 465 of the 89th Congress (1966) commended a three stage program to delimit jor flood hazards: (a) Listing of towns and eams with flood problems, (b) Outlining the od plain on maps or aerial photographs, and (c) celerating the present program of flood-hazard ormation reports. The U. S. Geological Survey s assigned primary responsibility for item (b). e U. S. Army Corps of Engineers has completed m (a) and has accelerated its program relative to m (c). The scope of the project includes all areas the United States where flooding from streams, es, and tides is a problem. Maps will be oduced for areas in the public domain where nagement or planning decisions are required d for undeveloped areas with recreational tential. (Woodard-USGS)
77-03341

LECTED DATA ON WATER WELLS, EOTHERMAL WELLS, AND OIL TESTS IN IPERIAL VALLEY, CALIFORNIA,
ological Survey, Menlo Park, Calif. Water sources Div.
F. Hardt, and J. J. French.
en-file report, July 1976. 251 p, 5 fig, 5 tab, 7

scriptors: *Geothermal studies, *Water wells, Vell data, *Water quality, *California, Basic ta collections, Water yield, Water levels, Water lization, Drawdown, Chemical analysis, oundwater, Oil.
ntifiers: *Geothermal wells, *Imperial Val-(Calif).

ta from water wells, geothermal wells, and oil ts, including water-quality records, isotope alyses, pressure and temperature information, d drillers' logs are presented for selected wells Imperial Valley, California. The report should useful for those involved in geothermal exoration, water development, and power producn, as well as professional analysts such as ologists, hydrologists, and modelers of the fluid w-heat transport system. (Woodard-USGS)
77-03348

ATA ON SELECTED LAKES IN WASHINGON, PART 5,
ological Survey, Tacoma, Wash. Water sources Div.
P. Dion, G. C. Bortleson, J. B. McConnell, and K. Innes.
ashington Department of Ecology, Olympia, ater-Supply Bulletin 42, Part 5, 1976. 125 p, 1 , 32 ref.

scriptors: *Lakes, *Washington, *Chemical operties, *Physical properties, *Biological prorties, Data collections, Sampling, Water analy-, Chemical analysis, Water quality, Dissolved ygen, Aerial photography, Bathymetry, Lake orphometry, Maps, Contours, Profiles.

is report, the fifth in a series, contains physical, emical, and biological data collected from 26 lakes in eastern and western Washington during 1974. Information for each lake includes a description of the physical setting, a general discussion of water quality, a bathymetric map, and an aerial photograph. The basic data include depth profiles of dissolved-oxygen concentration and temperature. Each lake was sampled four times, from winter to late summer. (See also W76-08564 and W74-12341) (Woodard-USGS)
W77-03350

WATER QUALITY SIMULATION OF TAHOE-TRUCKEE SYSTEM, NEVADA-CALIFORNIA - VOLUME II - APPENDICES,
Nevada Univ., Reno. Center for Water Resources Research.
For primary bibliographic entry see Field 5A.
W77-03351

USE OF HYBRID COMPUTER MODEL IN RESOURCE PLANNING,
Central and Southern Florida Flood Control District, West Palm Beach.
For primary bibliographic entry see Field 6A.
W77-03523

USEFUL MODELING CONCEPTS FOR THE FCD WATER SYSTEM,
Central and Southern Florida Flood Control District, West Palm Beach.
For primary bibliographic entry see Field 6A.
W77-03524

SIMULATION OF PESTICIDE MOVEMENT ON SMALL AGRICULTURAL WATERSHEDS,
ESL, Inc., Sunnyvale, Calif.
For primary bibliographic entry see Field 5B.
W77-03540

8. ENGINEERING WORKS

8A. Structures

CAVITATION FROM SURFACE IRREGULARITIES IN HIGH VELOCITY,
Colorado State Univ., Fort Collins.
For primary bibliographic entry see Field 8B.
W77-03082

EXPERIMENTAL INVESTIGATION OF FLOW OVER SIDE WEIRS,
Cairo Univ., Giza (Egypt). Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W77-03317

8B. Hydraulics

MINIMUM UNIT STREAM POWER AND FLUVIAL HYDRAULICS,
Corps of Engineers, Chicago, Ill. North Central Div.
C. T. Yang.
Proceedings of ASCE, Vol. 102, No. HY7, Proc. 12238, July 1976, p. 919-934. 9 fig, 3 tab, 9 ref. OWRT B-075-ILL(3). 14-31-0001-3881.

Descriptors: *Hydraulics, *Open channel flow, Rivers, *Sediment transport.
Identifiers: *Fluvial hydraulics, Unit stream power.

Fluvial hydraulics is complex because the velocity, slope, depth, and channel roughness are all subject to change. The unit stream power, defined as the rate of potential energy expenditure per unit weight of water, required to transport a given sediment load is sensitive to water depth when the sediment concentration is low. The interdependence between unit stream power and water depth decreases as sediment concentration increases. A computer program is used to generate different combinations of velocity, slope, depth, and unit stream power for a given sediment load. The generated unit stream power in the lower flow regime either has a clear minimum value at a particular depth or approaches a minimum value for a given sediment load. These agreements suggest that an alluvial channel in the lower flow regime adjusts its velocity, slope, depth, and roughness in such a manner that a given sediment load can be transported with the minimum amount of unit stream power.
W77-03080

HYDRODYNAMIC FORCES ON MULTIPLE CIRCULAR CYLINDERS,
Oregon State Univ., Corvallis. Dept. of Civil Engineering.
T. Yamamoto.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 102, No. HY9, Proceedings Paper 12395, p 1193-1210, September 1976. 10 fig, 14 ref, 2 append. NOAA 04-5-158-2.

Descriptors: *Hydrodynamics, *Mathematical studies, *Flow around objects, Analysis, Equations, Vibrations, Waves(Water), Coastal structures, Earthquakes, Flow, Structures.
Identifiers: *Potential flow, *Force coefficients, Cylinders, Forces, Added mass.

The potential flow solution was determined for a number of cylinders in translational motions perpendicular to their axes and submerged in a uniform flow. The number of cylinders, their radii, and the directions of the motions were all arbitrary. The hydrodynamic forces were obtained analytically. For a simplified case of two cylinders, the general hydrodynamic forces were expressed in terms of six force coefficients which are functions of the cylinder radii and the distance between them. However, the coefficients were independent of the direction of motion of the cylinders. The added mass coefficient of a cylinder moving near a rigid boundary in a still fluid is from 2.3 to 1.0, whereas the coefficient of a stationary cylinder near a rigid circular boundary in a uniform flow varies from 5.6 to -1. The results may be useful to the earthquake-resistant design of offshore structures as well as to the wave force desugn of such structures. (Adams-ISWS)
W77-03081

CAVITATION FROM SURFACE IRREGULARITIES IN HIGH VELOCITY,
Colorado State Univ., Fort Collins.
J. W. Ball.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 102, No. HY9, Proceedings Paper No. 12435, p 1283-1297, September 1976. 27 fig, 16 ref, 1 append.

Descriptors: *Cavitation, *Prototype tests, *Hydraulic design, *Design criteria, *Boundaries(Surfaces), Flow characteristics, Hydraulic structures, Spillways, Outlet works, Photography, Construction joints, Structural behavior.
Identifiers: *Cavitation damage, High velocity flow, Cavitation index, Surface roughness.

Irregularities in flow surfaces of hydraulic structures operating at high velocities have been the source of serious damage by cavitation. The types of surfaces often encountered in construction were shown, and many examples of cavitation damage induced by irregularities were shown photographically. Charts from which critical sizes of some of the types can be determined were presented. Methods used to reduce the irregularities to acceptable tolerance were noted, and the use of aeration slots and tunnel offsets used in recent designs to eliminate cavitation damage that would otherwise occur at the irregularities was reviewed. (Adams-ISWS)

W77-03082

QUADRATIC FINITE ELEMENTS IN SHALLOW WATER PROBLEMS,
Universidade Federal do Rio Grande do Sul, Porto Alegre (Brazil).
P. W. Partridge, and C. A. Brebbia.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 102, No. HY9, Proceedings Paper 12418, p 1299-1313, September 1976. 11 fig, 8 ref, 2 append.

Descriptors: *Channels, *Coastal engineering, *Analytical techniques, *Hydrodynamics, *Estuaries, Momentum equation, Numerical analysis, Continuity equation, Tides, Computers, Finite element analysis.
Identifiers: *Implicit scheme, Shallow water equations, Forcing function.

Two quadratic finite element models of the shallow water equations were presented. One model used an explicit fourth order Runge Kutta time integration scheme; the other model used an implicit trapezoidal rule scheme. The shallow water equations comprise two momentum equations and a continuity equation. The models were applied to a rectangular channel, simulating tidal behavior of an estuary. Stability, accuracy, and influence of friction and advective terms on the results were described. Bottom topography was shown to influence the results by changing the nature of the wave in the channel. Advective terms need to be included in the model if there is significant bottom slope. In real situations, the model was started with the water still and the surface flat. In the frictionless situation, spurious wave forms were produced which related to the natural frequencies of the channel. The spurious wave forms may be damped out by the specification of a high level of friction. (Singh-ISWS)
W77-03083

FLOW AND BED TOPOGRAPHY IN CURVED OPEN CHANNELS,
Tokyo Inst. of Tech. (Japan). Dept. of Civil Engineering.
H. Kikkawa, S. Ikeda, and A. Kitagawa.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 102, No. HY9, Proceedings Paper 12416, p 1327-1342, September 1976. 9 fig, 1 tab, 14 ref, 1 append.

Descriptors: *Curves, *Hydraulics, *Open channel flow, *Beds under water, *Topography, River flow, Meanders, Deposition(Sediments), Scour, Sedimentation, Rivers, Flow, Open channels, Channels.
Identifiers: *Secondary flow.

Mean flow characteristics and bed shear distributions in uniformly curved open channels were studied theoretically, and the results were compared with experiments and field observations. Next, an equation which expresses the variation of transverse bed profile was derived by considering an equilibrium of forces acting on a sand particle. It was shown that the magnitude of the secondary flow and the transverse bed slope determine the direction of sand movement. The numerical solution of the bed variation with time was compared with experiments, and it was concluded that the model employed here describes the bed variation fairly well. The stable profile of the bed was obtained analytically, and from this result, the maximum depth of scour which occurs at the outer banks was calculated. (Bhowmik-ISWS)
W77-03084

EXACT SOLUTION OF GRADUALLY VARIED FLOW,
Ahmadu Bello Univ., Zaria (Nigeria). Dept. of Civil Engineering.
M. A. Gill.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 102, No. HY9, Proceedings Paper 12406, p 1353-1364, September 1976. 1 fig, 5 ref, 2 append.

Descriptors: *Gradually varied flow, *Hydraulic design, *Hydraulic gradient, *Numerical analysis, Hydraulics, Slopes, Equations, Mathematical studies, Channels.
Identifiers: *Belanger's equation.

Exact algebraic solutions for the gradually varied flow equation were obtained for several integral and nonintegral values of the hydraulic exponents. A method of obtaining solutions for any value of the hydraulic exponents was explained. It was pointed out that the algebraic solutions can be programmed on computers for any particular flow problem, but these solutions are of academic interest only. (Bhowmik-ISWS)
W77-03085

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT, VOLUME 5, HYPOTHETICAL FLOODS,
Hydrologic Engineering Center, Davis, Calif.
L. R. Beard.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-A017 434, Price codes: A09 in paper copy, A01 in microfiche. Report HEC-IHD-0500, March 1975. 191 p, 17 fig, 19 ref, 4 append.

Descriptors: *International Hydrological Decade, *Storms, Hydrographs, Storm structure, Standards, Probable maximum precipitation, Streams, Streamflow, Computer programs, Rainfall-runoff relationships, Simulation analysis, Computer models.
Identifiers: *Storm synthesis, *Storm transportation, Storm centering, Balanced hydrographs, Standard project flood, Probable maximum flood, Storm studies, Stream system, *Hypothetical floods.

Volume 5 of a 12-volume report entitled 'Hydrologic Engineering Methods for Water Resources Development,' discussed techniques and procedures for synthesizing hypothetical rainfall-snowmelt-runoff events. Standard project and probable maximum floods simulation were those used by the Corps of Engineers. Storm centering, use of rainfall frequency data, balanced hydrographs, and several computer programs were discussed. Examples and illustrations were included. The following computer programs were included as appendices: (1) Unit Hydrograph and Hydrograph Computation Computer Program; (2) Hydrograph Combining and Routing Computer Program; (3) Balanced Hydrograph Computer Program; and (4) Streamflow Routing Optimization Computer Program. (See also W77-03105, W74-01642, and W74-13177) (Roberts-ISWS)
W77-03104

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT, VOLUME 6, WATER SURFACE PROFILES,
Hydrologic Engineering Center, Davis, Calif.
W. A. Thomas.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-A017 435, Price codes: A07 in paper copy, A01 in microfiche. Report HEC-IHD-0600, August 1975. 122 p, 33 fig, 4 tab, 32 ref.

Descriptors: *Hydraulics, *Hydrology, *Water resources development, Free surfaces, Computer models, Mathematical studies, Computers, Automation, Equations, Engineering, Profiles, Computer programs.
Identifiers: *Free surface flow, *Water surface profiles, Energy component.

Volume 6 was part of a 12-volume report entitled 'Hydrologic Engineering Methods for Water Resources Development,' prepared as a part of t Corps of Engineers' participation in the Intern tional Hydrological Decade. This volume relat the mathematical equations for flow in natu channels to the physical process. The most co mon method for solving these basic equations, t standard step method, was developed for compl cross sections using techniques which are suitab for both hand and computer calculations. One the objectives of this volume was to delineate t degree of simplification that is appropriate f analysis of water surface profiles in natural cha nels. The procedures were illustrated by solving example problem by manual computations; ho ever, the more common practice in the Corps Engineers was to utilize electronic computers calculate water surface profiles. Programs for t purpose are readily available. (See also W7 03104, W74-01642, and W74-13177) (Rober ISWS)
W77-03105

APPLICATION OF A MODEL FOR LAYOU AND DESIGN OF SEWER SYSTEMS,
Illinois Univ. at Urbana-Champaign. Dept. of Ci Engineering.
For primary bibliographic entry see Field 5B.
W77-03133

SCOUR AROUND BRIDGE PIERS,
West Virginia Univ., Morgantown. Engineeri Experiment Station.
G. R. Hopkins, R. W. Vance, and B. Kasraie.
Available from the National Technical Inform tion Service, Springfield, VA 22161 as PB-249 67 Price codes: A10 in paper copy, A01 in microfich Report FHWA-RD-76-56, March 1975. 205 p, 1 fig, 10 tab, 111 ref, 4 append. DOT-FH-11-7759.

Descriptors: *Scour, *Bridges, *Rivers, *Pie Model studies, Mathematical models, On-site i vestigations, Measurement, Instrumentatio Equipment, Depth, On-site data collectio Velocity, Fathometers, Water circulation, Er sion, Sediments.
Identifiers: *Pier scour, Scour formulas, Scour i strumentation, Scour field data collection.

Available theories and prediction formulas scour at bridge waterways were reviewed. Form las that offer potential for prediction of sco around bridge piers were compared by reduci each formula to a non-dimensional form that i cludes Froude number, the ratio of scour depth pier width, and the ratio of stage to pier width. field study to gather data on scour and related va ables was described. The study was aimed at c lecting field data in order to furnish a basis which to compare scour prediction formulas. Fo test sites were included in the study. These sit were located on: (1) the Red River in Shrevepo Louisiana; (2) the Brazos River in Richmon Texas; (3) the Homochitto River near Broo haven, Mississippi; and (4) the Ohio River Lawrenceburg, Indiana. An automatic instrume tation system that measures scour depth at thr points around a bridge pier as well as river sta was used in this study. The system was based on depth measuring fathometer. The test protocol a study philosophy were discussed. Data gather from the field sites were presented and compar to values predicted from scour formulas. Recor mendations were made on ways to improve th scour research effort. Recommendations includ improved instrumentation systems, addition field studies, laboratory studies computer progra development. (Sims-ISWS)
W77-03294

EFFECTS OF A BREAKWATER O NEARSHORE CURRENTS DUE TO BREAKIN WAVES,
Cornell Univ., Ithaca, N.Y. Dept. of Civil E gineering.
P. L-F. Liu, and C. C. Mei.

U. of I. URBANA-CHAMPAIGN

ailable from the National Technical Informa-
n Service, Springfield, VA 22161 as AD-A020
, Price codes: A12 in paper copy, A01 in
rofiche. Coastal Engineering Research Center
chnical Memorandum No. 57, November 1975.
p, 73 fig, 2 tab, 45 ref, 3 append. Army
CW72-72-C-0023.

scriptors: *Model studies, *Breakwaters,
rrents(Water), Coastal structures, Mathemati-
models, Shore protection, Waves(Water),
an waves, Shores, Refraction(Water waves),
draulics, Coastal engineering.
ntifiers: Nearshore currents, Offshore break-
ers, Shore-connected breakwaters, Diffrac-
.

s study provided a semi-empirical theory of
rshore currents due to breaking waves in the
sence of a shore-connected breakwater or an
shore breakwater. The effects of diffraction
e studied in addition to refraction by shoaling
ers. The concept of radiation stresses applied
uniform longshore current and rip currents
med the starting point of the theory. Many em-
cal relations included in this study with regard
he surf zone are similar to, and extrapolations
the ones used in related works. Ignoring con-
tive inertia and lateral turbulent diffusion, the
erning equations were solved numerically by
method of finite differences. Sample results
stream functions and mean sea levels were
tted for various beach profiles or incidence an-
s. For the offshore breakwater, the predicted
rent pattern is consistent with available labora-
y observations and the known tendency of tom-
o formation; for the shore-connected break-
er, the computed flow pattern exhibits cells in
h downwave and upwave regions. Directly rele-
t observations have not been found, but part of
predicted features has some indirect experi-
ntal support. More experimental and theoretical
rk was suggested. (Sims-ISWS)
7-03297

E RESPONSE OF NATURAL CHANNELS TO
BANIZATION: TWO CASE STUDIES FROM
UTHEAST ENGLAND,
iversity Coll., London (England). Dept. of
ography.
primary bibliographic entry see Field 4C.
7-03314

PERIMENTAL INVESTIGATION OF FLOW
ER SIDE WEIRS,
ro Univ., Giza (Egypt). Dept. of Civil En-
ering.
El-Khashab, and K. V. H. Smith.
rnal of the Hydraulics Division, American
iety of Civil Engineers, Vol. 102, No. HY9,
ceedings Paper 12402, p 1255-1268, September
6. 9 fig, 6 ref, 2 append.

scriptors: *Channels, *Weirs, *Spillways,
en channel flow, Open channels,
charge(Water), Hydraulic structures, Hydrau-
, Momentum equation, Equations, Computers.
ntifiers: *Side weirs, Weir crests, Lateral
rs.

ervations at numerous cross sections in a side
r channel showed that the total energy of flow
reases substantially along the channel, which is
trary to the assumption that has frequently
n made. The decrease in total energy occurs
ause the longitudinal component of velocity of
spill flow is greater than the longitudinal
city of the flow remaining in the channel. A
sfactory flow equation was derived from mo-
tum principles. The equation was further
eloped into a computer technique for calculat-
flow profiles and spill discharges for side
rs. (Lee-ISWS)
7-03317

LANDSLIDE GENERATED WATER WAVE MODEL,
Alabama Univ., University. Dept. of Engineering Mechanics.
D. C. Raney, and H. L. Butler.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 102, No. HY9, Proceedings Paper 12425, p 1269-1282, September 1976. 9 fig, 1 tab, 8 ref, 2 append.

Descriptors: *Reservoirs, *Montana, *Waves(Water), *Mathematical models, Landslides, Numerical analysis, Hydraulics, Hydrodynamics, Equations, Simulation analysis, Model studies.
Identifiers: *Water wave models, Rockfalls.

A numerical model was developed for simulating the development and propagation of landslide generated water waves in reservoirs. The numerical model was based upon a finite difference representation of the depth averaged hydrodynamic equations. The landslide is formulated as a moving boundary condition, propagating into the reservoir, and accelerating the fluid due to physical displacement and viscous drag. Arbitrary reservoir geometry and landslide parameters can be considered. The numerical model results were compared with experimental results obtained on a 1:120 undistorted scale physical model of Libby Dam and Lake Koocanusa in Montana. Landslides were considered, reflecting a wide range of landslide volumes and velocities. The wave heights predicted by the numerical model were in good agreement with the wave heights observed in the physical model. (Lee-ISWS)
W77-03318

HYDROLOGY AND ENVIRONMENTAL ASPECTS OF ERIE CANAL (1817-99),
Geological Survey, Reston, Va. Water Resources Div.
W. B. Langbein.
Available from the Supt. of Documents, GPO, Wash., D.C. 20402, Price $1.20. Water-Supply Paper 2038, 1976. 92 p, 12 fig, 7 tab, 67 ref.

Descriptors: *Canals, *Inland waterways, *Lake Erie, *Transportation, *Environmental effects, Water quality, Water pollution, Floods, Ships, Appraisals, Hydrology, Sediments, Economics, Hydraulics, Land development, History.
Identifiers: *Erie Canal.

As the first major water project in the United States, the old Erie Canal provides an example of the hydrological and environmental consequences of water development. The available record shows that the project aroused environmental fears that the canal might be impaired by the adverse hydrologic effects of land development induced by the canal. Water requirements proved greater than anticipated, and problems of floods and hydraulic inefficiencies beset navigation throughout its history. The Erie Canal proved the practicality of major hydraulic works to the extent that operations and maintenance could cope with the burdens of deficiencies in design. Among the large set of effects of the canal upon the water environment that took place but that had not been considered in the planning or design were those on river flows, landforms, ground water, vegetation, and fish migration. The overriding fact that the initial anxieties of the planners proved unwarranted and that environmental conditions did not become intolerable by the standards of that time probably led to neglect of consideration of environmental risks in subsequent public works practice during the 19th century. (Woodard-USGS)
W77-03334

FLOODFLOW CHARACTERISTICS AT PROPOSED BRIDGE SITE ABOVE SHERWOOD ROAD ON WEST BRANCH DELAWARE RIVER, DELHI, NEW YORK,
Geological Survey, Albany, N. Y. Water Resources Div.
For primary bibliographic entry see Field 4A.
W77-03337

8C. Hydraulic Machinery

PHYSIOCHEMICAL AND BIOLOGICAL CONDITIONS IN TWO OKLAHOMA RESERVOIRS UNDERGOING ARTIFICIAL DESTRATIFICATION,
Oklahoma State Univ., Stillwater. Dept. of Agriculture Engineering.
For primary bibliographic entry see Field 2H.
W77-03208

MECHANICAL MOLE BURROWS SEWER TUNNEL,
Public Works, Vol. 107, No. 11, p 62-63, November, 1976. 1 fig.

Descriptors: *Sewers, *Construction equipment, *Safety, *Tunnelling machines, *Tunnelling, Costs.

The use of a boring machine to create a sewer tunnel in Quincy, Illinois, was evaluated. With this machine, it was possible to build a tunnel with 50 percent increased sewage outflow capacity at no additional costs. Safety margins were greater and the problems associated with blast and drill methods were avoided. The machine bored a tunnel 8 feet, 2 inches, by 5 feet, 3 inches wide as compared to an 8-foot diameter tunnel originally planned. With this method, damage to surrounding rock by blasting was avoided. The horseshoe shape of the board tunnel allowed additional height for maintenance headroom and the smaller arch gives the tunnel greater strength and stability. Tunnel construction proceeded at rates similar to conventional drill and blast methods while overbreak and fracturing due to blasting were avoided. The operation of the machine was similar to a milling machine that shaves metal surfaces. (Collins-FIRL)
W77-03397

LARGE FACTORY-BUILT PUMP STATION BEGINS OPERATION.
Water and Sewage Works, Vol. 123, No. 8, p 86, August, 1976.

Descriptors: *Pumps, *Sewerage, *Energy, Control systems, Design criteria, Waste water treatment, Equipment, Sewers, Pipelines, Operating costs, Kansas.
Identifiers: Pumping stations, Kansas City(Kan).

As part of its new sewage project, Kansas City, Kansas, installed a new pump station. The station employs a variable frequency control system with two 200-hp pumps and another on standby. It can pump 11,250 gallons per minute of waste water up a 77.1 ft head through 44 in. sewer lines. It is designed to provide more interior room and use less steel, and can accomodate a variety of pump types inside. The energy efficient design should provide substantial operational savings. (Collins-FIRL)
W77-03438

8D. Soil Mechanics

EARTH AND ROCK-FILL DAMS: BASIS OF THEIR DESIGN AND CONSTRUCTION, SECOND EDITION,
S. N. Moiseev.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-248 217, Price codes: A99 in paper copy, A01 in microfiche. Technical Translation 72-58002, 1975. 647 p, 227 fig, 21 tab, 53 ref. Translation of monograph Kemenno-Zemlianye i Kamennonabrosnye Plotiny Osnovy Proektirovaniia i Stroitelstva, Moscow (USSR), 1970.

Descriptors: *Dams, *Dam design, *Dam construction, *Rockfill dams, *Earth dams, Construction, Construction materials, *Design, Maintenance, Dimensions, Foundations, Embankments, Dam foundations, Labor, Soil mechanics, Rocks, Reinforced concrete, Climates, Cold weather construction, Civil engineering.
Identifiers: *USSR.

An analysis of the design, construction, and exploitation of the most economical types of earth-fill and rock-fill dams was given on the basis of local and foreign literature. Great attention was given to the production of work during the time of erection of the dam, the materials used and their preparation, the equipment used in laying the materials in the body of the dam, and the construction of the anti-filtration constructions. Examples of existing dams were mentioned which gives the possibility of choosing the most rational methods of constructing works in accordance with various conditions. (Sims-ISWS)
W77-03102

UNDRAINED BEHAVIOR OF EMBANKMENTS ON NEW LISKEARD VARVED CLAY,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering: and Massachusetts Inst. of Tech., Cambridge. Constructed Facilities Div.
S. M. Lacasse, C. C. Ladd, and A. K. Barsvary.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-251 002, Price codes: A04 in paper copy, A01 in microfiche. Report No. R-75-45, June 1975. 58 p, 17 fig, 2 tab, 27 ref, append. R23-0.

Descriptors: *Embankments, *Varves, *Canada, Clays, Bank stability, Stress analysis, Soil strength, Pore pressure, Finite element analysis, Drainage, Anisotropy, Consolidation, Failures, On-site tests, Laboratory tests, Deformation.
Identifiers: *Soft soil, *Undrained pore pressures.

The performance, including a failure, of two embankments in New Liskeard, Canada was analyzed. The underlying 150 ft (45.8 m) of medium-to-soft varved clay was studied with respect to stability, undrained deformations, and excess pore pressure distribution. Total stress stability analyses were performed with undrained strengths based on measured and corrected field vane strengths, the average UC and UU strength, and SHANSEP strength parameters with and without anisotropy. Several approaches yielded satisfactory factors of safety and reasonable critical arcs. Effective stress analyses using pore pressures predicted from finite element analyses showed that either the effective stress strength parameters were much lower than those measured in the laboratory or the predicted pore pressures at failure were much too low. Undrained deformations and excess pore pressures at end of construction were predicted with the finite element program FEECON. The values were generally consistent with field measurements for an embankment located 200 ft (61.0 m) from the failure area. (Visocky-ISWS)
W77-03108

PIPING IN EARTH DAMS CONSTRUCTED OF DISPERSIVE CLAY; LITERATURE REVIEW AND DESIGN OF LABORATORY TESTS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Soils and Pavements Lab.
E. B. Perry.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A018 695, Price codes: A07 in paper copy, A01 in microfiche. Technical Report S-75-15, November 1975. 125 p, 66 fig, 10 tab, 142 ref, 3 append.

Descriptors: *Earth dams, *Porous media, *Saturated flow, *Hydraulic structures, *Reviews, *Australia, Laboratory tests, Laboratory equipment, Soil analysis, Testing, Soil erosion, Soil chemical properties, Soil physical properties, Soil mechanics, Pore pressure, Cohesive soils, Clays, Illite, Publications, Clay minerals, Kaolinite, Montmorillonite, Permeameters, Seepage.
Identifiers: *Piping(Erosion), Dispersive clays, Crumb test.

It was assumed when empirical piping criteria were developed 25 years ago that soil type and method of construction were the main parameters controlling the resistance of homogeneous earth dams to piping failure. Research on piping failure in earth dams constructed of dispersive clay (a particular type of soil in which the clay fraction erodes in the presence of water by a process of deflocculation) was initiated in Australia about 15 years ago. This research resulted in a method of analysis to assess the susceptibility of a homogeneous earth dam, constructed of predominately illite or montmorillonite clay, to dispersive clay piping. The first study of dispersive clay in the United States, reported in 1972, developed a relationship between percent sodium and total soluble salts in the soil pore water extract and field performance of earth dams as evidenced by piping failure or rainfall erosion damage. This research has demonstrated the usefulness of the pinhole erosion test as a method of identifying dispersive clays, shown the feasibility of using filters to prevent piping in dispersive clays, and indicated that stabilization of dispersive clays is possible. A laboratory pinhole erosion apparatus was designed and constructed at the Waterways Experiment Station (WES). A series of laboratory tests was designed to standardize a procedure for use of the pinhole erosion test as a method of identifying dispersive clays, evaluating the effectiveness of filters in preventing piping in dispersive soils, and determining the influence of selected parameters on erodibility of dispersive clays. The procedure for conducting the Crumb Test was given in Appendix A, and Appendixes B and C present detailed drawings and photographs, respectively, of the WES laboratory erosion test apparatus. (Humphreys-ISWS)
W77-03112

8E. Rock Mechanics and Geology

EARTH AND ROCK-FILL DAMS: BASIS OF THEIR DESIGN AND CONSTRUCTION, SECOND EDITION,
For primary bibliographic entry see Field 8D.
W77-03102

A SEISMOTECTONIC STUDY OF SEISMIC AND VOLCANIC HAZARDS IN THE PRIBILOF ISLANDS - EASTERN ALEUTIAN ISLANDS REGION OF THE BERING SEA,
Lamont-Doherty Geological Observatory, Palisades, N. Y.
For primary bibliographic entry see Field 2L.
W77-03243

THE ENVIRONMENTAL GEOLOGY AND GEOMORPHOLOGY OF THE GULF OF ALASKA COASTAL PLAIN,
Alaska Univ., College. Dept. of Geology.
For primary bibliographic entry see Field 2L.
W77-03246

DELINEATION AND ENGINEERING CHARACTERISTICS OF PERMAFROST BENEATH THE BEAUFORT SEA,
Cold Regions Research and Engineering Lab., Hanover, N. H.
For primary bibliographic entry see Field 2C.
W77-03247

YUKON DELTA COASTAL PROCESSI STUDY,
Wesleyan Univ., Middletown, Conn. Dept. Earth and Environmental Sciences.
For primary bibliographic entry see Field 2L.
W77-03255

FAULT HISTORY OF THE PRIBILOF ISLAN AND ITS RELEVANCE TO BOTTOM STABIL TY IN THE ST. GEORGE BASIN,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2L.
W77-03256

EARTHQUAKE ACTIVITY AND GROUN SHAKING IN AND ALONG THE EASTER GULF OF ALASKA,
Geological Survey, Menlo Park, Calif. Office Earthquake Studies.
For primary bibliographic entry see Field 2L.
W77-03257

EROSION AND DEPOSITION OF SHELF SEI MENT: EASTERN GULF OF ALASKA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2L.
W77-03258

FAULTING AND INSTABILITY OF SHEL SEDIMENTS: EASTERN GULF OF ALASKA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2L.
W77-03259

SEISMIC AND VOLCANIC RISK STUDIES WESTERN GULF OF ALASKA,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 2L.
W77-03260

OFFSHORE PERMAFROST-DRILLING, BOU DARY CONDITIONS, PROPERTIE PROCESSES AND MODELS,
Alaska, Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 5B.
W77-03261

BENTHOS-SEDIMENTARY SUBSTRATE I TERACTIONS,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 5C.
W77-03263

FAULTING AND INSTABILITY OF SHEL SEDIMENTS - WESTERN GULF OF ALASKA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2L.
W77-03264

A HISTORICAL SUMMARY OF EARTHQUAK EPICENTERS IN AND NEAR ALASKA,
National Geophysical and Solar-Terrestrial Da Center, Boulder, Colo.
For primary bibliographic entry see Field 7C.
W77-03265

A STUDY OF BEAUFORT SEA COASTAL ERO SION - NORTHERN ALASKA,
For primary bibliographic entry see Field 2L.
W77-03266

DYNAMICS OF NEAR-SHORE ICE,
Cold Regions Research and Engineering Lab Hanover, N. H.
For primary bibliographic entry see Field 2C.
W77-03268

U. OF I. URBANA-CHAMP

NAMICS OF NEAR-SHORE ICE (DATA OYS),
shington Univ., Seattle. Dept. of Atmospheric ences.
r primary bibliographic entry see Field 2C.
7-03269

UDY OF CLIMATIC EFFECTS ON FAST ICE TENT AND ITS SEASONAL DECAY ALONG E BEAUFORT SEA COAST,
lorado Univ., Boulder. Inst. of Arctic and Al- e Research.
r primary bibliographic entry see Field 2C.
7-03270

ECHANICS OF ORIGIN OF PRESSURE DGES, SHEAR RIDGES AND HUMMOCK ELDS IN LANDFAST ICE,
ska Univ., College. Geophysical Inst.
r primary bibliographic entry see Field 2L.
7-03271

ORPHOLOGY OF BEAUFORT NEAR SHORE E CONDITIONS BY MEANS OF SATELLITE D AERIAL REMOTE SENSING,
ska Univ., College. OCS Coordination Office.
r primary bibliographic entry see Field 2C.
7-03273

PERIMENTAL MEASUREMENTS OF SEA E FAILURE STRESSES NEAR GROUNDED RUCTURES,
ska Univ., College. OCS Coordination Office.
r primary bibliographic entry see Field 2C.
7-03274

AUFORT SEA, CHUKCHI SEA, BERING RAIT HISTORICAL BASELINE ICE STUDY,
ska Univ., College. Dept. of History.
r primary bibliographic entry see Field 2C.
7-03275

VELOPMENT OF HARDWARE AND OCEDURES FOR IN-SITU MEASUREMENT CREEP IN SEA ICE,
ska Univ., College. Geophysical Inst.
r primary bibliographic entry see Field 2C.
7-03276

ERATION OF AN ALASKAN FACILITY FOR PLICATIONS OF REMOTE-SENSING DATA OCS STUDIES,
ska Univ., College. Geophysical Inst.
r primary bibliographic entry see Field 7B.
7-03277

'. Concrete

EVALUATION OF SELECTED INSTRU- NTS USED TO MEASURE THE MOISTURE NTENT OF HARDENED CONCRETE,
ny Engineer Waterways Experiment Station, ksburg, Miss. Concrete Lab.
F. O'Neil, and J. E. McDonald.
ailable from the National Technical Informa- n Service, Springfield, VA 22161 as ADA-022 , Price codes: A02 in paper copy, A01 in rofiche. Technical Report C-76-1, February 6. 69 p, 8 fig, 33 plates, 2 ref.

scriptors: *Concretes, *Moisture content, strumentation, Measurement, Equipment, aluation, Laboratory tests, Moisture meters, ges, Construction, Construction materials, terials engineering, Civil engineering.
ntifiers: *Concrete moisture.

types of gages for measuring moisture content hardened concrete were studied to determine their behavior in long-term service. The gages were evaluated with respect to stability of measurement and response to moisture change. The gages were mounted in a 12- by 12- by 18-in copper box, and the box was filled with concrete and a copper lid soldered to it. The gages were monitored for a period of 800 days. For the first 194 days, the gages were read in a hermetically sealed environment. Then, for 326 days (194 to 520 days), the copper lid was removed and the box was exposed to a 50% relative humidity atmosphere. From 520 to 722 days, the concrete specimen was exposed to 50% relative humidity after being entirely removed from the copper box. For the last 78 days of the test, from 722 to 800 days, the bare concrete block was monitored in a 100% relative humidity atmosphere (fog room). The results of the test indicated that two gages (the ionic barrier moisture gage and the Bouyoucos moisture gage) reacted the most favorably during the entire 800-day test period. Both of the mentioned types of gages gave results that were responsive to environmental changes and stable with respect to time. (Sims-ISWS)
W77-03295

8G. Materials

PLASTIC-REINFORCED ASPHALT SEEPAGE BARRIER,
Arizona Water Resources Research Center, Tucson.
For primary bibliographic entry see Field 3B.
W77-03120

AN EVALUATION OF SELECTED INSTRUMENTS USED TO MEASURE THE MOISTURE CONTENT OF HARDENED CONCRETE,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Concrete Lab.
For primary bibliographic entry see Field 8F.
W77-03295

STRENGTH OF ICE UNDER MULTIAXIAL LOADING,
Southwest Research Inst., San Antonio, Tex.
For primary bibliographic entry see Field 2C.
W77-03301

ALLATOONA LAKE, DESTRATIFICATION EQUIPMENT TEST REPORT.
Army Engineer District, Savannah, Ga.
For primary bibliographic entry see Field 5G.
W77-03306

ALLATOONA LAKE, DESTRATIFICATION EQUIPMENT TEST, APPENDIX A, OPERATIONAL AND WATER QUALITY DATA, 1968.
Army Engineer District, Savannah, Ga.
For primary bibliographic entry see Field 5G.
W77-03307

ALLATOONA LAKE, DESTRATIFICATION EQUIPMENT TEST, APPENDIX B, OPERATIONAL AND WATER QUALITY DATA, 1969.
Army Engineer District, Savannah, Ga.
For primary bibliographic entry see Field 5G.
W77-03308

ALLATOONA LAKE, DESTRATIFICATION EQUIPMENT TEST, APPENDIX C, OPERATIONAL AND WATER QUALITY DATA, 1970.
Army Engineer District, Savannah, Ga.
For primary bibliographic entry see Field 5G.
W77-03309

ALLATOONA LAKE, DESTRATIFICATION EQUIPMENT TEST, APPENDIX D, EFFECTS OF ARTIFICIAL DESTRATIFICATION ON TEMPERATURE AND DISSOLVED OXYGEN IN ALLATOONA RESERVOIR.
Associated Water and Air Resources Engineers, Inc., Nashville, Tenn.
For primary bibliographic entry see Field 5G.
W77-03310

SHIP-TO-SHORE SEWAGE HOSE HANDLING TESTS,
Civil Engineering Lab. (Navy), Port Hueneme, Calif.
For primary bibliographic entry see Field 5D.
W77-03364

DUCTILE IRON PIPE SOLVES A TOUGH SEWER PROBLEM AT JIMERSON CREEK,
T. F. Stroud.
Ductile Iron Pipe News, p 9-11, Spring-Summer, 1976.

Descriptors: *Sewerage, *Pipelines, *Iron, Maintenance, Waste water treatment, Infiltation, Inflow, Joints(Connections), Construction materials.
Identifiers: *Ductile iron pipe, Rubber gaskets.

Ductile pipe was used to replace deteriorated sewer piping at Jimerson Creek near Little Rock, Arkansas. Ductile iron pipe was chosen because of its ability to withstand harsh bedding conditions without breaking and the protection it provides against large rocks and other debris in the Creek. Permanence and low-maintenance needs were also prime considerations. Rubber-gasketed joints helped to eliminate infiltration/inflow which had been a problem with the older concrete mortar joints previously used. Completed in 1975, the ductile iron line performed much as expected. (Collins-FIRL)
W77-03398

INNOVATIONS IN SEWER DESIGN AND CONSTRUCTION,
Richardson (Edward H.) Associates, Inc., Newark, Del.
D. L. Willis.
Public Works, Vol. 107, No. 11, p 44-47, November, 1976.

Descriptors: *Sewerage, *Manholes, *Cost analysis, *Plastic pipes, *Construction equipment, Construction costs, Delaware, Pipelines, Safety factors.
Identifiers: *Trenchless sewers.

A trenchless sewer construction demonstration (E.P.A. Project No. S-800690) was described. The project's purpose was the development of construction techniques in which it would not be necessary to have a man enter a construction trench. Another design intent was the redefinition of relative factors such as manhole needs and design. Bethany Beach, Delaware, was chosen as the demonstration site. Preliminary cost studies projected as much as 25 percent savings over traditional construction methods. The machinery involved plows open an earth section and pulls in a length of polyethylene pipe. There were minor problems with pipe tension, 'floating' pipes, and cold-weather brittleness of the PVS pipes. The fiscal savings and safety aspects of this construction method are expected to make it an attractive alternative to more traditional procedures. (Collins-FIRL)
W77-03399

PRECAUTIONS TO BE TAKEN IN THE CONSTRUCTION AND MAINTENANCE OF WATER SUPPLY AND SEWER SYSTEMS (PRECAUTIONS A PRENDRE DANS LA CONSTRUCTION ET L'ENTRETIEN DES RESEAUX D' AQUEDUC ET D' EGOUT),
Yvan Asselin.
Eau du Quebec, Vol. 9, No. 3, p 8-9, August, 1976.

Descriptors: *Surveys, *Inspection, *Maintenance, *Water supply, *Sewerage, Water distribution(Applied), Pipelines, Valves, *Canada.
Identifiers: Fountains, Quebec.

A survey performed on the water treatment practices of the 155 towns in Quebec with populations of 5000 or more revealed that the levels of inspection and cleaning of water lines were generally low. Improvements in quality and service could be achieved by checking valve operation at least twice a year, checking operation of street fountains three or four times a year, cleaning the water lines at least twice a year, checking the sewage lines regularly and cleaning them at least twice a year, and seeking and eliminating leakage. Application of modern construction techniques can eliminate many potential or actual problems; these techniques include proper preparation of the pipe beds, packing a filler around the pipes, sealing the joints with rubber, providing inspection points with constrictions to maintain flow speeds, ensuring easy access to inspection sites, firmly connecting the cesspools, providing for electrical conductivity of water supply lines, selecting optimal valves, and establishing proper anchoring and drainage for street fountains. Modern devices are available for leakage and continuity detection. (Text in French) (Henson-FIRL)
W77-03400

INFILTRATION/INFLOW IMPROVEMENTS IN THE OYSTER BAY SEWER DISTRICT,
Holzmacher, McLendon and Murrell, Melville, N. Y.
For primary bibliographic entry see Field 5D.
W77-03401

CONDUCTING SEWER SYSTEM EVALUATIONS FOR SMALL SYSTEMS,
For primary bibliographic entry see Field 5D.
W77-03581

8I. Fisheries Engineering

ENVIRONMENTAL INVENTORY AND ASSESSMENT OF NAVIGATION POOLS 24, 25, AND 26, UPPER MISSISSIPPI AND LOWER ILLINOIS RIVERS; AN ELECTROFISHING SURVEY OF THE ILLINOIS RIVER,
Illinois Natural History Survey, Havana. River Research Lab.
R. E. Sparks.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A020 069, Price codes: A06 in paper copy, A01 in microfiche. Contract Report Y-75-4, December 1975. 122 p, 5 fig, 36 tab, 67 ref. Army DACW39-74-M-3084.

Descriptors: *Rivers, *Fish, *Mississippi River, *Surveys, *Fish populations, Navigable rivers, Electro-fishing, Fish food organisms, Fish types, Freshwater fish, Pollutants, Fish diseases, Sediments, Turbidity, Suspended solids, Water pollution, Water pollution sources, Water pollution effects, Water levels, Fisheries, Commercial fishing, Biology.
Identifiers: *Illinois River.

The fish populations of the Illinois River were sampled in the autumn of 1974 by means of a 220-volt AC electroshocker. The sampling was done as part of an environmental inventory and assessment of effects of maintenance and operation of the 9-ft navigation channel in Pools 24, 25, and 26 on the Upper Mississippi River and lower 80 miles of the Illinois River. Comparative data were available from similar electro-fishing surveys conducted from 1959 through 1973. Commercial fishing statistics and results of earlier fish surveys were available as far back as the 1870's. The Illinois River begins at the confluence of the Kankakee and Des Plaines Rivers. The effect of municipal and industrial discharges from the Chicago-Joliet area was evident in electro-fishing catches from the Des Plaines River--only the introduced carp, goldfish, and hybrids of these two pollution-tolerant species were abundant, and most were diseased. There was a greater variety and abundance of fishes in the Illinois River compared to the Des Plaines River, and the fish were generally in better condition. The greatest catches of commercial and game fishes came from La Grange and Peoria Pools (Middle Illinois River), which have the largest connecting lake area. Impacts of physical-chemical changes in the river on the fish populations were reported. (Sims-ISWS)
W77-03302

LIMNOLOGICAL CHARACTERISTICS OF STRIP MINE PONDS IN NORTHWESTERN COLORADO, U.S.A.,
For primary bibliographic entry see Field 5C.
W77-03538

9. MANPOWER, GRANTS AND FACILITIES

9A. Education (Extramural)

ANNUAL REPORT, 1975-1976, (HAWAII WATER RESOURCES RESEARCH CENTER),
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 9D.
W77-03165

9D. Grants, Contracts, and Research Act Allotments

ANNUAL REPORT, 1975-1976, (HAWAII WATER RESOURCES RESEARCH CENTER),
Hawaii Univ., Honolulu. Water Resources Research Center.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 349, Price codes: A04 in paper copy, A01 in microfiche. (1976), 74 p. OWRT A-999-HI(13).

Descriptors: *Projects, Information exchange, *Water Resources Institute, *Hawaii, *Research and development, *Universities, Colleges, Training, Grants, Contracts, Education.
Identifiers: Water research programs, Annual report(Hawaii).

An unusual Water Resource Research accomplishment of the year's program was the first major review of the state's critical water problems and the planning for research and data collection to solve Hawaii's problems in a joint study by the Hawaii Water Resources Regional Study and the Center. Among 9 water problem areas, over 20 specific study needs were identified. An unprecedented number of projects (34) comprised the year's program and the concentration of projects was in the field of water and sediment qualities and biota. Laboratory analytical methodology was established for identifying possible carcinogens in water, municipal waste waters were tested for pesticides and heavy metals, algal growth potential was determined for natural and waste waters. Water supply, flood, and drought-related research and data collection systems were conducted. Groundwater and the associated water infiltration through soils were studied. Water recycling from municipal and domestic waste water effluent for sugarcane irrigation gained acceptance not only as a supplement to the agricultural water supply, but also as an alternative to ocean disposal of waste water for the islands of Oahu, Maui, and Kauai. The study of pathogenic enteric viruses associated with sewage continued to be a major research program of the Center.
W77-03165

REPORT ON TENTH ANNUAL WATE RESOURCES RESEARCH CONFERENC SPONSORED BY OFFICE OF WATE RESEARCH AND TECHNOLOGY, APRIL 9-1 1975.
Office of Water Research and Technolog Washington, D. C.
Available from the National Technical Inform tion Service, Springfield, VA 22161 as PB-262 44 Price codes: A05 in paper copy, A01 in microfich (1976), 95 p.

Descriptors: *Conferences, Water resources i stitute, *Water Resources Research Ac *Research and development, *Allotments, Feder government, *Research priorities, *Federal pr ject policy, Grants, Contracts, Federal budget State governments.

The tenth conference, held under the auspices the newly formed Office of Water Research a Technology (a creation which consolidated the a tivities of the Office of Water Resources Resear and the Office of Saline Water) convened Washington, D. C., April 9-10, 1975. The asse blage constituted persons involved in water pr grams, such as the Directors of the State Wat Resources Research Institutes and other represe tatives and observers, from the entire spectrum the nationwide water community, including for t first time, representatives concerned with sali water conversion activities. The 1975 Conferen theme focused on Technology Transfer. The fo plenary sessions delved into topics such as t Congressional viewpoint regarding the water pr gram, technology transfer in action, a review the saline water conversion program and a prese tation on the recommendations of the 1974 Wat Resources Research Advisory Panel highlight w a presentation by Dr. A. R. Chamberlain, Pr sident of Colorado State University, representi the National Association of State Universities a Land Grant Colleges on the Joint Department the Interior/NASULGC Water Research and Ed cation Advisory Committee.
W77-03206

10. SCIENTIFIC AND TECHNICAL INFORMATION

10C. Secondary Publication And Distribution

PUBLICATIONS LIST OF THE IDAHO WATI RESOURCES RESEARCH INSTITUTE,
Idaho Univ., Moscow. Water Resources Resear Inst.
Available from the National Technical Inform tion Service, Springfield, VA 22161 as PB-262 3 Price codes: A04 in paper copy, A01 in microfic April 1976, 35 p. OWRT A-999-IDA(7).

Descriptors: *Bibliographies, Informati retrieval, *Publications, *Idaho, *Wa Resources Institute, Grants, Contracts, Docume tation, *Information exchange.

Compilation has been made of all reports, thes and journal articles prepared in conjunction w research activities of the Idaho Water Resour Research Institute. Both an author and a subj index are used to assist the reader in locating dividual reports. The publications are listed project under four main headings: OWRT All ment project; OWRT Matching Grant projec OWRT Title II projects; and miscellaneous pu cations. (Trihey-Idaho)
W77-03154

1973 WESTERN STATE CONFERENCE O WATER INFORMATION DISSEMINATION.
Arizona Water Resources Research Center, Tu son.

ailable from the National Technical Informa-
n Service, Springfield, VA 22161 as PB-262 350,
ce codes: A05 in paper copy, A01 in microfiche.
ceedings of a Conference, June 8, 1973,
enix, Arizona, 98 p. K.J. DeCook and K. E.
ter, editors. OWRT A-031-ARIZ(1). 14-31-
1-5003.

scriptors: Bibliographies, Data collections,
ata storage and retrieval, *Conferences, Data
nsmission, *Information exchange,
ocumentation, Information retrieval.
ntifiers: *Information dissemination, *Western
ited States.

ports on current water information dissemina-
n activities by the states stressed that each of us
eds to know what the other is doing; duplication
effort among the several State water institutes
agencies is to be avoided; and for what duplica-
n already exists, the antidote is coordination of
ort. It was also brought out that the public in-
asingly wishes to be involved in water
ources planning, so that an interpersonal
earcher-user contact seems to be required. To
ablish the desired contact, some kind of com-
n language is needed by which water informa-
n and research results can be translated into
ms meaningful to the user. Toward this end,
cialists are needed who can at once understand
researcher's language and also comprehend
user's practical needs. In the State panel
cussion it was recognized that more water in-
mation is available than can be assimilated in
gmented form by the public sectors; the inter-
diary therefore must develop 'organized infor-
tion' and convey it in some structured form to
user. In the Interstate panel discussion it was
ggested that, where a credibility gap exists
tween research and its application, the proper
sponse is a broad dissemination of selected
nds of processed information to selected public
ctors. Regarding computerized water data
rage and retrieval systems, it was agreed that a
gional data system may not be feasible at this
ne, but that an exchange of existing program
scriptions and subroutines, a degree of stan-
rdization of data coding forms, and a coopera-
e evaluation of existing data systems, would be
sirable for coordinated action among the
stern states.
77-03166

ROUND-WATER LEVELS IN NEW MEXICO, 75,
ological Survey, Albuquerque, N. Mex. Water
sources Div.
r primary bibliographic entry see Field 7C.
77-03330

XPERIMENTAL ECOLOGY OF SELECTED ERTEBRATE SPECIES,
tsburgh Univ., Pa.
r primary bibliographic entry see Field 6G.
77-03564

0D. Specialized Information Center Services

PING IN EARTH DAMS CONSTRUCTED OF SPERSIVE CLAY; LITERATURE REVIEW ND DESIGN OF LABORATORY TESTS,
rmy Engineer Waterways Experiment Station,
cksburg, Miss. Soils and Pavements Lab.
r primary bibliographic entry see Field 08D.
77-03112

73 WESTERN STATE CONFERENCE ON ATER INFORMATION DISSEMINATION.
rizona Water Resources Research Center, Tuc-
n.
r primary bibliographic entry see Field 10C.
77-03166

LIBRARY U. OF I. URBANA-CHAMPAIGN

SUBJECT INDEX

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2,4-D
Practical Alternatives to 2,4,5-T for Chemical Control of Brush Along Drainage Ditches and General Watershed Use,
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- Ground and surface water hydrology at the Illinois State Water Survey.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

Supported by the Environmental Protection Agency in cooperation with WRSIC

- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.
- Municipal wastewater treatment technology at the Franklin Institute Research Laboratories.

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SELECTED WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center, Office of Water Research and Technology, U.S. Department of the Interior

VOLUME 10, NUMBER 8
APRIL 15, 1977

W77-03601 -- W77-04100

Secretary of the U.S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

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FOREWORD

elected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent nographs, journal articles, reports, and other publication nats. The contents of these documents cover the water-ted aspects of the life, physical, and social sciences as as related engineering and legal aspects of the charac-tics, conservation, control, use, or management of water. h abstract includes a full bibliographical citation and a set escriptors or identifiers which are listed in the **Water ources Thesaurus.** Each abstract entry is classified into ields and 60 groups similar to the water resources re-rch categories established by the Committee on Water ources Research of the Federal Council for Science and hnology.

SIC IS NOT PRESENTLY IN A POSITION TO PROVIDE PIES OF DOCUMENTS ABSTRACTED IN THIS JOUR-. Sufficient bibliographic information is given to enable ders to order the desired documents from local libraries ther sources.

ected Water Resources Abstracts is designed to serve scientific and technical information needs of scientists, neers, and managers as one of several planned services he Water Resources Scientific Information Center RSIC). The Center was established by the Secretary of the rior and has been designated by the Federal Council for nce and Technology to serve the water resources com-ity by improving the communication of water-related earch results. The Center is pursuing this objective by co-nating and supplementing the existing scientific and tech-l information activities associated with active research investigation program in water resources.

provide WRSIC with input, selected organizations with ve water resources research programs are supported as nters of competence" responsible for selecting, abstract-ing, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on the inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the Bio-Science Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
Washington, DC 20240

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NATURE OF WATER

. Properties

ALYTIC EQUATION OF STATE FOR SEA TER,
ipps Institution of Oceanography, San Diego, if. Marine Physical Lab.
primary bibliographic entry see Field 1B.
7-03770

OTHERMAL INVESTIGATIONS IN IDAHO, RT 4, ISOTOPIC AND GEOCHEMICAL ALSES OF WATER FROM THE BRUNEAU-AND VIEW AND WEISER AREAS, UTHWEST IDAHO,
ological Survey, Reston, Va.; and Geological vey, Boise, Idaho.
T. Rightmire, H. W. Young, and R. L. itehead.
ho Department of Water Resources, Boise, ter Information Bulletin No 30, July 1976. 28 p, ig, 6 tab, 22 ref.

scriptors: *Geothermal studies, *geochemistry, roundwater recharge, *Deuterium, *Oxygen opes, *Idaho, Hydrogeology, Precipita-(Atmospheric), Topography, Water levels, springs, Water wells, Data collections.
ntifiers: Southwest Idaho, Bruneau-Grand w area(Idaho), Weiser area, Oxygen-18.

riations of deuterium and oxygen-18 concentra-ns in thermal ground water and local nonther-l springs have been used to aid in describing the rce of recharge in the Bruneau-Grand View Weiser areas, southwest Idaho. Isotope and chemical data for the Bruneau-Grand View a suggest that recharge to the area may not be irely from sources within the local surface-inage area, but possibly from the areas of her altitude of the Bruneau River drainage to southeast; or that the hot water that wells and ings are discharging is water that was recharged a time when the regional climate was much der than the present climate. Recharge to the iser area is probably from areas of higher al-de to the north and northeast of the local inage area. However, 'local' precipitation does uence both the chemical and isotopic composi-ns of the waters in each area. (See also W76-55 and W75-10147) (Woodard-USGS)
7-03896

3. Aqueous Solutions and Suspensions

ALYTIC EQUATION OF STATE FOR SEA ATER,
ipps Institution of Oceanography, San Diego, if. Marine Physical Lab.
H. Fisher, R. B. Williams, and O. E. Dial, Jr.
ailable from the National Technical Informa-n Service, Springfield, VA 22161 as AD-A019 , Price code: A02 in paper copy, A01 in crofiche. SIO Reference 75-30, December 1, 5. 14 p, 3 fig, 9 tab, 18 ref. ONR N00014- 69-A-0-6002, NSF DES-70-00094A04.

scriptors: *Volume, *Pressure, *Salinity, *Sea ter, *Water properties, Physical properties, emical properties, Saline water, Water quality, mperature, Sea water, Equations, Mathematics, merical analysis, Mathematical studies, Proper-s.
ntifiers: *Tumlirz equation, *Pure water, *Pure ter properties, Sea water properties, Adiabatic dient.

rlier work by Fisher and Dial on pure water and water showed the effectiveness of the Tumlirz equation in representing the precision pure water data of Kell and Whalley from 0 to 150 C up to 1000 bars. In addition, it was also shown that a modified Tumlirz equation could be used to represent the sea water data of Wilson and Bradley. The equation is V = V sub infinity -K sub 1 times S + lambda/P sub 0 + K2S + P, where V is the specific volume, P the pressure, S the salinity, and V sub infinity, lambda, and P sub 0 are temperature dependent parameters for pure water. In this paper, the thermal expansion data of Bradshaw and Schleicher and the sound velocity data of Wilson have been incorporated to yield a new equation of state for sea water. Values of the adiabatic gradient calculated with this equation for S = 35 parts per thousand are slightly lower at 2 C than those reported by Fofonoff, for example, 4% at 400 bars and 7% at 1000 bars. (Henley-ISWS)
W77-03770

2. WATER CYCLE

2A. General

RUNOFF FILES FOR FLOOD HYDROGRAPH SIMULATION,
Hydrocomp, Inc., Atlanta, Ga. Atlanta Regional Office.
For primary bibliographic entry see Field 2E.
W77-03748

EXPERIMENTS WITH THE SURFACE HEAT AND WATER BUDGETS OF THE CANADIAN MIDDLE NORTH,
McGill Univ., Montreal (Quebec). Dept. of Meteorology.
For primary bibliographic entry see Field 2D.
W77-03749

A COMPARISON OF MODELING AND STATISTICAL EVALUATION OF HYDROLOGIC CHANGE,
Melbourne and Metropolitan Board of Works (Australia).
For primary bibliographic entry see Field 4D.
W77-03800

HYDROLOGIC ASPECTS OF SPACE INVESTIGATIONS OF THE EARTH'S SURFACE (LITERATURE SURVEY),
For primary bibliographic entry see Field 7B.
W77-03848

PRELIMINARY DIGITAL MODEL OF GROUND-WATER FLOW IN THE MADISON GROUP, POWEDER RIVER BASIN AND ADJACENT AREAS, WYOMING, MONTANA, SOUTH DAKOTA, NORTH DAKOTA, AND NEBRASKA,
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 2F.
W77-03882

UNCERTAINTY IN THE RETURN PERIOD OF MAXIMUM HYDROLOGIC EVENTS: A BAYESIAN APPROACH,
Arizona Univ., Tucson. Dept. of Systems and Industrial Engineering; and Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
D. R. Davis, L. Duckstein, and M. M. Fogel.
Journal of Hydrology, Vol 31, No 1/2, p 81-95, September 1976. 4 fig, 2 tab, 28 ref. OWRT B-032-ARIZ(18). NSF GK-35791.

Descriptors: *Storms, *Floods, *Risks, *Frequency, *Model studies, Thunderstorms, Distribution, Rainfall-runoff relationships, Water resources, Seasonal.
Identifiers: *Bayesian approach, Event-based rainfall model, Distribution parameters.

The effect of uncertainty in parameter of rainfall inputs on the return period of maximum rainfall amounts and runoff volumes in a thunderstorm season was ascertained. The return period of the maximum seasonal rainfall amount was considered using an event-based rainfall model which incorporates the distribution of the number of events per season and the distribution of point rainfall per event. The runoff and peak flow were calculated from the event-based rainfall model coupled with a linear rainfall-runoff relationship. A distribution function for peak flows was developed considering the uncertainties in the distribution parameters of the two distributions in the event-based rainfall model. It was found that the expected values of return periods vary substantially even for a record length of twenty years. The Bayesian approach for a decision-theoretic analysis of a water resource design problem was shown to be advantageous inasmuch as the effects of uncertainties on the design are evaluated. (Singh-ISWS)
W77-03972

CONTROL OF FJORDIC DEEP WATER RENEWAL BY RUNOFF MODIFICATION,
Dunstaffnage Marine Research Lab., Oban (Scotland).
For primary bibliographic entry see Field 2L.
W77-03975

APPLIED MATHEMATICAL MODELLING IN MARINE SCIENCE,
Liege Univ. (Belgium). Institut de Mathematique.
For primary bibliographic entry see Field 2L.
W77-04008

2B. Precipitation

ON A DERIVABLE FORMULA FOR LONG-WAVE RADIATION FROM CLEAR SKIES,
Cornell Univ., Ithaca, N.Y. School of Civil and Environmental Engineering.
W. Brutsaert.
Water Resources Research Vol 11, No 5, p 742-744, October 1975. 1 fig, 1 tab, 16 ref.

Descriptors: *Radiation, Mathematical studies, Mathematics, Model studies, Atmosphere, Climatology.
Identifiers: *Long-wave radiation, *Formula derivation, Emissivity.

A derivation is presented for the effective atmospheric emissivity to predict downcoming long-wave radiation at ground level under a clear sky and for a nearly standard atmosphere. The results are in good agreement with those obtainable with empirical formula based on water vapor pressure and temperature. However, the proposed formulation has the advantage that its simple functional form is based on physical grounds without the need for empirical parameters from radiation measurements. Also, in contrast to the empirical equations, it may be adjusted in a simple way to reflect changes in climatic and atmospheric conditions. (Skogerboe-Colo St)
W77-03638

WATER RESOURCES DATA SYSTEM,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 7C.
W77-03728

DESERTIFICATION: SYMPTOM OF A CRISIS,
International Center for Arid and Semi-Arid Land Studies, Lubbock, Tex.
For primary bibliographic entry see Field 4C.

W77-03737

THE CONSEQUENCES OF FOOLING MOTHER NATURE,
Arizona Univ. Tucson. Dept. of Geosciences.
T. L. Smiley.
In: Desertification: Process, Problems, Perspectives, Arid-Semi-Arid Natural Resources Program seminar papers, University of Arizona, p 25-31, Sept. 1976.

Descriptors: *Arid lands, *Semiarid climates, *Climatology, Impact(Rainfall), Precipitation(Atmospheric), Solar radiation, Air circulation, Irrigation effects.
Identifiers: *Desertification, Deforestation, Overgrazing.

The climatic characteristics of arid lands and the human contribution to desertification are described. Arid or semiarid regions have in common only the scarcity of precipitation and available water. Of the earth's land surface, 20% is considered arid and 15% semiarid. The arid and semiarid conditions are relative in terms of total precipitation and rate of precipitation. A partial account of arid land formation is presented in terms of global effects from solar radiation and consequent atmospheric changes and air movements. Deforestation, livestock overgrazing, cereal cultivation, the pumping of water from underground sources, and irrigation of dry land are all considered contributors to desertification. (Jahns-Arizona)
W77-03738

ATMOSPHERIC DUST AND SURFACE ALBEDO: EFFECTS ON DESERTIFICATION,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 2D.
W77-03739

THE TWO-AXIS METHOD: A NEW METHOD TO CALCULATE AVERAGE PRECIPITATION OVER A BASIN,
Forest Service (USDA), Ogden, Utah. Intermountain Forest and Range Experiment Station.
N. Bethlahmy.
Hydrological Sciences Bulletin, Vol. 21, No. 3, p 379-385, September 1976. 3 fig, 1 tab, 11 ref.

Descriptors: *Mathematical studies, *Precipitation(Atmospheric), *Basins, Orography, Rain gages, Isohyets, Watersheds(Basins), Average, Mathematics.
Identifiers: *Two-axis method, Thiessen method, Areal average precipitation, Weighting, Station angle.

The two-axis method, used to calculate average precipitation over a basin, was based on three assumptions inherent in the Thiessen and isohyetal methods. The method followed four steps: (1) the two axes of a basin are drawn following a standard procedure; (2) for each raingage location, a station angle is determined by either measuring or calculating the angle between lines connecting the station location to the farthest ends of the two axes; (3) each station is assigned a weight (the ratio of its angle to the sum of all station angles); (4) average area precipitation is calculated as the sum of the products of corresponding station weights and measured precipitation. The method is fast, efficient, and readily computerized. (Jones-ISWS)
W77-03755

A PRELIMINARY STUDY OF THE MAGNITUDE, FREQUENCY AND DISTRIBUTION OF INTENSE RAINFALL IN NIGERIA,
Ibadan Univ. (Nigeria). Dept. of Geography.
J. O. Ayoade.
Hydrological Sciences Bulletin, Vol. 21, No. 3, p 419-429, September 1976. 6 fig, 3 tab, 18 ref.

Descriptors: *Precipitation(Atmospheric), *Probable maximum precipitation, *Statistical methods, *Rainfall, *Cloudbursts, Frequency, Distribution, Foreign countries, Distribution patterns, Mapping, Mathematical studies.
Identifiers: *Nigeria, Daily rainfall, Chow method, Gumbel method.

Estimates were made of magnitude/frequency relationships for daily rainfall amounts recorded at representative Nigerian stations. Probable maximum precipitation estimates also were made base on the Chow general frequency formula. It was found that the daily probable maximum precipitation varied from 9.5 inches to 23.79 inches. (Jones-ISWS)
W77-03756

AUGMENTATION OF 1968-1972 WINTER STORMS IN NEW MEXICO,
New Mexico State Univ., University Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 3B.
W77-03838

WATERFOWL AND ACID PRECIPITATION IN NORWAY, (IN DANISH),
Zoologisk Museum, Oslo (Norway).
For primary bibliographic entry see Field 5C.
W77-03841

TIME OF PONDING--COMPARISON OF RESULTS OF THE PARLANGE SOLUTION WITH THE SMITH AND MEIN-LARSON MODELS,
Indian Inst. of Tech. Bombay. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2G.
W77-03855

RECENT MEASUREMENTS OF WIND STRESS ON ARCTIC SEA ICE,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Atlantic Oceanographic Lab.
For primary bibliographic entry see Field 2C.
W77-03980

STORM SURGES IN THE SOUTHERN BEAUFORT SEA,
Department of the Environment, Victoria (British Columbia). Inst. of Ocean Sciences.
For primary bibliographic entry see Field 2L.
W77-03986

INTENSITY OF RAINFALL IN CLERMONE-FERRAND, (IN FRENCH),
J. Tixeront.
Rev Sci Nat Auvergne 39 (1-4), p 13-30, 1973.

Descriptors: *Rainfall intensity, Seasonal, *Agriculture, Precipitation(Atmospheric), *Soil erosion, Europe.
Identifiers: *France(Clermont-Ferrand).

The intensity, duration, accumulated precipitation and seasonal variations of rainfall from 1958-1973 are reported. Applications of such information are discussed, including problems in agriculture related to soil erosion from rainfall.--Copyright 1976, Biological Abstracts, Inc.
W77-04032

2C. Snow, Ice, and Frost

THEORETICAL MODEL OF RIVER ICE JAMS,
Iowa Univ., Iowa City. Inst. of Hydraulic Research.
M. S. Uzuner, and J. F. Kennedy.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 102, No HY9, Proceedings Paper 12412, p 1365-1383, Septem
1976. 10 fig, 12 ref, 1 append. Army DAC25-73
0032, NSF GK-3590X1.

Descriptors: *Ice jams, *Ice, *Model stud
Mathematical models, Rivers, Ice loads, Freez
Flow, Unsteady flow, Open channel flow, Cl
nel flow, Non-uniform flow, Floods, Bridges,
cover.

A mathematical analysis was developed
describe the evolution and characteristics of r
ice jams. The principal components of the ana
cal model were the static force equilibrium of
fragmented ice cover; the unsteady contin
equations for the frozen and liquid water;
nonuniform, unsteady momentum relation for
flow; and relations in which compressive
shear strengths of the floating fragmented
cover vary linearly with local jam thickness. A
merical method was outlined for solving the e
tions for the case in which the jam has evolve
the point that it propagates upstream with cons
velocity (quasi-steady conditions), and a comp
set of example results was presented for a spe
flow and channel. Estimates were derived for
time required for the jam to evolve to the qu
steady state and for the velocity of the jam f
during the evolutionary stage. (Sims-ISWS)
W77-03745

**ESTIMATE OF THE SUITABILITY OF TELE
SION INFORMATION FROM METEOROLO
CAL METEOR SATELLITES FOR DETERM
ING ICE CONDITIONS IN LAKES AND RES
VOIRS,**
V. G. Prokacheva.
Soviet Hydrology, Selected Papers, No 1, p 2
1975. 3 fig, 3 tab, 6 ref. Translated from Tr
Gossudarstvennogo Gidrologicheskogo Instit
No 205, p 115-123, 1975.

Descriptors: *Remote sensing, *Ice co
*Lakes, *Reservoirs, Satellites(Artificial),
Photography, Winter, Cold regions, Freez
Thawing.
Identifiers: *Meteor satellite.

The operative meteor satellite system regu
transmits television pictures to earth that s
cloud distribution and the state of the underl
surface in cloud-free regions of the world. Ice
mations that appear on the water surface ch
its natural albedo and are necessarily reprod
on TV pictures. The contribution of ice format
to the TV image depends on the amount and
of ice. The images of the same lake, obtaine
different phases of its ice regime, differ
respondingly. The estimated terrain resolutio
the TV picture is 1.25-3 km. Consequently, l
with an area greater than 4-9 sq km are reprod
on the photographs (by at least several sign
and their ice conditions can thus be estimated.
TV information from meteor satellites is suit
for determining ice conditions in large, med
and small lakes and reservoirs. Under favo
conditions, it is possible to estimate ice condit
for lakes and reservoirs exceeding 10 sq k
area. The volume of useful information on ice
ditions in a lake, extractable from TV picture
determined not only by the size of the bod
water, but also by its shape. The more the sha
a lake or reservoir departs from a square, the
detailed (under otherwise equal conditions) th
formation on ice conditions in the lake or r
voir. (Sims-ISWS)
W77-03765

**SEASONAL VARIATIONS OF CHEMI
CONSTITUENTS IN ANNUAL LAYERS
GREENLAND DEEP ICE DEPOSITS,**
State Univ. of New York at Buffalo. Dep
Earth Sciences.
C. C. Langway, Jr, J. H. Cragin, G. A. Klouda,
M. M. Herron.

ible from the National Technical Informa-
ervice, Springfield, VA 22161 as ADA-021
Price codes: A02 in paper copy, A01 in
fiche. CRREL Research Report 347,
nber 1975. 8 p, 2 fig, 14 ref. NSF OPP 750-

iptors: *Ice, *Core logging, *Dating, Chemi-
hemical analysis, Seasonal, Annual, Cold re-
Foreign countries, Ice cover, Glaciology.
fiers: *Greenland, Ice cores, Seasonal varia-
Chemical variations.

ical analysis of century-old ice from continu-
to 7 year intervals of three ice cores from
and central Greenland (Dye 3, Milcent, and
showed maximum concentrations of Na,
Ca, K, and Al during early spring and
um concentrations during late summer and
fall. Peak spring values are as much as 10
greater than fall values. Because of the large
nal chemical variations, samples used for
-age or annual deposition rate studies must
sent accumulation from exactly one year or
multiples of a year. The seasonal chemical
ions seem promising as a new method of
ng annual layers and thus dating old ice
(Sims-ISWS)
03773

OF SATELLITE SURVEY MATERIAL IN
CIOLOGICAL INVESTIGATIONS,
emiya Nauk SSSR, Moscow. Institut
rafii.
Garelik, A. M. Grinbert, and A. N. Krenke.
t Hydrology, Selected Papers, No. 1, p 45-
75. 3 fig, 2 tab, 18 ref. Translated from News
e USSR Academy of Sciences, Geographic
s (Izvestiya Akad. nauk SSSR. Ser. geograf.),
, p 93-101, 1975.

riptors: *Remote sensing, *Snow surveys,
iers, Satellites(Artificial), Snow, Precipita-
Atmospheric), Runoff, Photography, Photo-
metry, Analytical techniques, Surveys,
melt, Water resources, Mountains, Mapping,
processing.
ifiers: *USSR.

mages of ice and snow on photographs taken
the manned orbital station Salyut 1 by the
onauts G.T. Dobrovol'skiy, V.N. Volkov,
.I. Papayev were analyzed. Medial moraines
he ice and snow surfaces on glaciers are
nizable on the photographs. On the Southern
hek Glacier, one can see that its southern,
ide has more moraine inclusions. The photo-
s also show the medial moraines that divide
treams flowing from individual tributary
rs. The temporary snow line can be
ified reliably on the rocky surface. The accu-
of the stereophotogrammetric determination
evations was estimated from the differences
uble measurements at 30 points. The root-
-square error proved to be plus or minus 120
This includes photograph errors, survey
ra errors, instrumental errors, and errors as-
ted with the form of the photogrammetric in-
ction, which depends on the altitude and base
e survey. The study testified to the great pos-
ies offered by space photographs to
logical research. It must be emphasized that
possibilities include not only qualitative
ification of glaciological formations on space
graphs, but also the possibility of obtaining
titative information necessary for hydrologic
utations. (Sims-ISWS)
03851

MOISTURE MOVEMENT BY TEMPERA-
E GRADIENT,
land Univ. (New Zealand). Dept. of Civil En-
ring.
rimary bibliographic entry see Field 2G.
03861

OPERATIONAL APPLICATIONS OF SATELLITE SNOWCOVER OBSERVATIONS AND LANDSAT DATA COLLECTION SYSTEMS OPERATIONS IN CENTRAL ARIZONA,
Geological Survey, Tucson, Ariz. Water Resources Div.
H. H. Schumann.
Reprint from Proceedings of NASA Workshop on Operational Applications of Satellite Snowcover Observations, held at South Lake Tahoe, California, August 18-20, 1975: National Aeronautics and Space Administration Rept NASA SP-391, p 13-28, 1975. 8 fig, 1 tab, 4 ref.

Descriptors: *Snow cover, *Snowmelt, *Remote sensing, *Satellites(Artificial), *Telemetry, Snow surveys, Hydrologic data, Aerial photography, Reservoir operation, Arizona, Flood control, Watershed management.
Identifiers: *Salt-Verde watershed(Ariz).

Repetitive Landsat and NOAA-4 satellite imagery together with aerial surveys are being evaluated to develop an operational capability for mapping snowcover distributions on the Salt-Verde watershed of central Arizona. Satellite telemetry is being used also for near-real time relay of hydrologic data to aid in the management and operation of reservoirs on the Salt and Verde Rivers. For use in rating satellite imagery, the depth and distribution of snowcover was measured by examination of oblique aerial photographs of snow markers. This method allowed rapid and economical determination of snow depths. The Landsat Data-Collection System (DCS) relays hydrologic data from remote and relatively inaccessible earth-based sensors. The Landsat telemetry system relays information from streamflow- and snow-monitoring installations located in the upper parts of the Salt-Verde Watershed. (Woodard-USGS)
W77-03971

A CANADIAN ARCTIC FJORD WITH SOME COMPARISONS TO FJORDS OF THE WESTERN AMERICAS,
Department of the Environment, Victoria (British Columbia). Frozen Sea Research Group, and Department of the Environment, Victoria (British Columbia). Ocean and Aquatic Affairs.
For primary bibliographic entry see Field 2L.
W77-03977

RECENT MEASUREMENTS OF WIND STRESS ON ARCTIC SEA ICE,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Atlantic Oceanographic Lab.
E. G. Banke, S. D. Smith, and R. J. Anderson.
Journal of the Fisheries Research Board of Canada, Vol 33, No 10, p 2307-2317, October 1976. 10 fig, 5 tab, 16 ref.

Descriptors: *Sea ice, *Winds, *Wind pressure, *Arctic, Drag, Stress, Summer, Winter, Heat transfer, Seasonal, On-site investigations, Roughness coefficient, Model studies, Mathematical models, Laboratory tests, Ice.
Identifiers: *Wind stress, Wind drag.

Eddy flux measurements of wind stress on the Arctic Pack ice were made in summer and winter in terrain ranging from flat to hummocked. Parameterization by a drag coefficient dependent on a surface parameter was suggested. Reduced values of the drag coefficient were observed in highly stable stratification. The coefficient for sensible heat flux is lower than the drag coefficient. Wind drag on ice ridges has been measured by a pressure differential method. (Sims-ISWS)
W77-03980

ROLE OF THE SNOW COVER IN THE NATURE OF NORTHERN LANDSCAPES AND ITS PHYSICAL PROPERTIES,
Akademiya Nauk SSSR, Moscow. Institut Geografii.
V. G. Khodakov.
Soviet Hydrology, Selected Papers, No. 2, p 60-65, November 1975. 4 fig, 8 ref. Translated from Izvestiya Akademii Nauk SSSR, Seria Geograficheskaia, No. 1, p 17-26, 1975.

Descriptors: *Snow cover, *Mountains, *Tundra, Forests, Glaciers, Foreign countries, Snow, Foreign research, Physical properties, Albedo, Density, Water resources, Snowmelt, Cold regions, On-site investigations.
Identifiers: *USSR, *Polar Ural Mountains(USSR).

A brief description was given of the main results of investigations by the Polar Ural expedition of the Institute of Geography of the USSR Academy of Sciences of snow cover properties in various landscape zones. These investigations covered the glacial-alpine tundra belt of the Ural Mountains, and the tundra, forest-tundra, and taiga zones of the Cis- and Trans-Ural. The snow cover properties were investigated (specific mass, density, thermal conductivity, surface albedo, transparency to solar radiation, ultimate bending and tensile strength, viscosity coefficient, compaction under load, and trafficability of virgin land for caterpillar tractors), as well as their main spatial distribution patterns. It was concluded that further development of combined landscape-geophysical and special engineering snow surveys is needed. (Sims-ISWS)
W77-03988

GLACIAL LAKE SEDIMENTATION, AUSTERDALSISEN, NORWAY,
Manchester Univ. (England). Dept. of Geography.
For primary bibliographic entry see Field 2J.
W77-04005

2D. Evaporation and Transpiration

ESTIMATED WATER BALANCE FOR THE PROPOSED HADITHA RESERVOIR ON THE EUPHRATES RIVER IN IRAQ,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 4A.
W77-03625

EFFECT OF DEW ON LEAF WATER POTENTIALS AND CROP RESISTANCES IN A PASPALUM PASTURE,
Department of Scientific and Industrial Research, Palmerston North (New Zealand).
For primary bibliographic entry see Field 3F.
W77-03736

ATMOSPHERIC DUST AND SURFACE ALBEDO: EFFECTS ON DESERTIFICATION,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
S. B. Idso.
In: Desertification: Process, Problems, Perspectives, Arid/Semi-arid Natural Resources Program seminar papers, University of Arizona, p 32-39, March 1976. 20 ref.

Descriptors: *Dusts, *Albedo, *Arid lands, *Precipitation(Atmospheric), Radiation, Temperature, Erosion, Soil moisture.
Identifiers: *Desertification, *Atmospheric dust, *Surface albedo.

Existing literature concerning desertification is reviewed, theories of the process are discussed, and a model based on the effects of atmospheric dust and surface albedo is advanced. The author has investigated dust effects on long-wave thermal radiation from the atmosphere and linked dust-trapping inversions with increased surface temperatures. It is proposed that surface denudation and increased soil particles in the atmosphere may

cause overseeding of clouds and suppress rainfall. Soil moisture effects on albedo are described, along with the impact of atmospheric dust in the region of the solar spectrum. Studies indicate that as the albedo of the underlying surface increases, the ratio of absorption to backscattering coefficients of particles required for heating decreases. For the high albedos of many desert surfaces, the crucial ratio required for heating decreases to a value where heating will most likely occur at the surface if the dust content of the atmosphere increases. As this occurs, surface heating will be compensated by upper atmospheric cooling and resultant subsidence increases, reducing rainfall. (Jahns-Arizona).
W77-03739

EXPERIMENTS WITH THE SURFACE HEAT AND WATER BUDGETS OF THE CANADIAN MIDDLE NORTH,
McGill Univ., Montreal (Quebec). Dept. of Meteorology.
E. Vowinckel, and S. Orvig.
Tellus, Vol. 28, No. 5, p 442-450, 1976. 9 tab, 5 ref, 1 append.

Descriptors: *Hydrologic budget, *Canada, *Heat budget, *Surface runoff, Water balance, Hydrologic aspects, Hydrologic properties, Surface waters, Evaporation, Runoff, Hydrology, Surfaces, Vegetation effects, Rocks, Lichens, Hydrologic data.

The effects of surface changes on the heat and water budgets of the Canadian Middle North were studied for the region of The Pas, Manitoba, using a surface energy balance model and daily synoptic and radiosaonde observations for the period July 1967-June 1968. Comparisons were made with the results of a previous, similar investigation for the same period for the Boreal region of Moosonee, Ontario. The Boreal region showed a positive water budget for all surface types, i.e., runoff, while The Pas showed a substantial water deficit for all surface types except that of rock. This deficit was calculated when using similar surface type descriptions to those of Moosonee (bare ground, forest, lake, and rock). As the river runoff measurements indicate a moderate annual regional water surplus, it was concluded that there may be conditions at The Pas which reduce evaporation and which are not generally typical for other areas previously examined. Such possibilities were investigated. The main point of interest proved to be the characteristics of vegetation types like lichen, which has marked water retention properties because it generates strong resistance to evaporation. In order to obtain a realistic water budget for the region, it thus becomes essential to ascertain in considerable detail the structure of the vegetation cover and to calculate the evaporation from each of the various surface types. The composite regional water budget for 1967-1968 proved to be approximately balanced. Open water showed high evaporation loss, and lakes can only exist in the region by receiving water from surfaces of rock, lichen, moss, or thin soil. Maintaining an increased water area, as behind reservoir dams, would require either reduction in forest covered land or the import of water from outside the region. Large-scale destruction of moss and lichen would apparently have far reaching consequences for the regional water budget. (Humphreys-ISWS)
W77-03749

EVAPORATIVE COOLING OF A PARTIALLY-WET AND TRANSPIRING LEAF-I. COMPUTER MODEL AND ITS EVALUATION USING WIND-TUNNEL EXPERIMENTS,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
P. W. Westerman, B. J. Barfield, O. J. Loewer, and J. N. Walker.
Transactions of the American Society of Agricultural Engineers, Vol. 19, No. 5, p 881-888, September-October 1976. 3 fig, 6 tab, 16 ref, 3 append.

Descriptors: *Computer models, *Spraying, *Simulation analysis, *Model studies, *Leaves, *Evaporation, *Transpiration, Environment, Surface waters, Radiation, Energy, Wetting.
Identifiers: *Sprinkling systems, *Evaporative cooling, Transpiring leaf, Environmental conditions, Surface water characteristics, Short-wave radiation, Leaf thermal radiation, Leaf convection, DYNAMO simulation language.

A simulation computer model was developed using DYNAMO simulation language to predict the evaporative cooling of a transpiring leaf when water is present on the surface of the leaf. To verify the model, experimental tests were conducted with cucumber leaves in a wind tunnel using photoflood lamps as radiation sources and using drops approximating half spheres for surface wetting. Measured leaf temperature reductions during 10 minutes after surface wetting 20, 15, and 7% of the leaf's top side were 4.8, 4.4, and 4.0C, while the corresponding simulated temperature reductions were 3.0, 4.5, and 3.4C. Free stream velocity was 100 cm/s. (See also W77-03758) (Roberts-ISWS)
W77-03757

EVAPORATIVE COOLING OF A PARTIALLY-WET AND TRANSPIRING LEAF-II. SIMULATED EFFECT OF VARIATIONS IN ENVIRONMENTAL CONDITIONS, LEAF PROPERTIES, AND SURFACE WATER CHARACTERISTICS,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
P. W. Westerman, B. J. Barfield, O. J. Loewer, and J. N. Walker.
Transactions of the American Society of Agricultural Engineers, Vol. 19, No. 5, p 889-896, September-October 1976. 1 fig, 7 tab, 9 ref, 1 append.

Descriptors: *Evaporation, *Leaves, *Computer models, *Transpiration, Environment, Energy, Temperature, Radiation, Surface waters, Model studies.
Identifiers: *Transpiring leaf, *Energy fluxes, Leaf convection, Evaporative cooling, Surface water characteristics, Short-wave radiation, Leaf thermal radiation, DYNAMO simulation language.

The DYNAMO simulation language was used in a simulation computer model to predict the evaporative cooling of a transpiring leaf when water is present on its surface. Simulation was also used to determine the effect on leaf temperature of changing various model parameters. Parameters tested in the sensitivity analysis included initial conditions, environmental conditions, leaf properties, resistances to heat and mass transfer, and the amount and geometry of the water present. Results indicated that the cooling effect would normally be between 1 and 5C for up to 60% wetted area 10 minutes after applying surface water directly to a leaf. Air temperature and humidity had as much, or more, effect on leaf temperature as any of the other variables for the conditions tested. (See also W77-03757) (Roberts-ISWS)
W77-03758

SPACE-TIME CORRELATION FUNCTION OF THE FIELD OF EVAPORATION FROM THE WATER SURFACE,
Yu. A. Manktin.
Soviet Hydrology, Selected Papers, No 1, p 37-39, 1975. 3 fig, 3 tab, 7 ref. Translated from Trudy Gossudarstvennogo Gidrologicheskogo Instituta, No 205, p 73-79, 1975.

Descriptors: *Evaporation, *Spatial distribution, *Seasonal, Correlation analysis, Rivers, Lakes, Water loss, Air-water interfaces, Mathematical studies, Regression analysis, Variability, Homogeneity, Monthly.
Identifiers: *USSR.

An objective analysis of the field of evaporat from the water surface in the Soviet Union performed in 1972 for the first time at the Val Hydrologic Scientific Research Laboratory. correlation functions of the field of mont evaporation totals from GGI-3000 evaporimet were computed; the errors of the initial data an the optimum interpolation were estimated; and optimum distances between observation po were evaluated. However, problems associa with the seasonal pattern of the monthly corr tion coefficients remained unresolved. Th problems were discussed in this report. Nin values of pair correlation coefficients, cove distances from 0 to 3700 km between the netw stations, were computed for 35 evaporation tions with a degree of shielding of type I for lowland territory. The evaporation field homogeneous and isotropic with respect to correlation function for each month. To iden the seasonal pattern, space-time profiles of monthly functions were constructed. There wa distinct seasonal pattern of the correlation fu tion, except in October for which the value these functions are lower than for the o months. These differences are appare produced by an increase in the random error the initial data, the short records of concurrent servations used in sampling for this month, t unequal duration for different pairs of stati and the small number of computed values of correlation coefficients. To distances of 500 between stations, the total errors of optimum terpolation are lower by a factor of 2 or more t the natural climatic variation of evaporation the water surface. (Sims-ISWS)
W77-03849

LAKE ERIE TERRESTRIAL RADIATION,
National Oceanic and Atmospheric Adminis tion, Ann Arbor, Mich. Great Lakes Environm tal Research Lab.
For primary bibliographic entry see Field 2H.
W77-03858

EVAPORATION AND ADVECTION EVAPORATION FROM EXTENS HOMOGENEOUS SURFACES,
Department of Scientific and Industrial Resea Lincoln (New Zealand). Crop Research Div.
K. G. McNaughton.
Quarterly Journal of the Royal Meteorolo Society, Vol. 102, No. 431, p 181-191, Jan 1976. 21 ref.

Descriptors: *Evaporation, *Model stud *Advection, *Homogeneity, Latent heat, H transfer, Heat resistance, Vapor pressure, E tions.
Identifiers: *Bowen ratio, Sensible heat, Mois transfer, Heat flux, Net radiation, Psychrom constant.

The process of modification of the Bowen r with distance downwind of a change in sur wetness, is believed to establish the ratio of fluxes of sensible and latent heat when unaffe by surface inhomogeneity. The case of ste state, two-dimensional advection was conside It was shown that the coupled, simultaneous, fusion equations for heat and moisture tran from natural vegetated or wet surfaces can be to generate two indendent diffusion equation composite variables. The height integral of reciprocal effective eddy diffusivity is assume become indefinitely large with height, so that and moisture continuously accumulate within overpassing air. However, the surface latent flux approaches a quasi-equilibrium value gi in conventional symbols, by $LE = (s/(s + y))$ (G). For terrestrial surfaces, where the avail energy depends only slightly on surface temp ture, the Bowen ratio approaches y/s. For water bodies and melting snow, the heat flux the surface also evolves with distance, and above relationship is approached only in the tr

e that Rn = G and LE = 0. This model for ter-
ial surfaces was consistent with some recent
rimental observations. (Jones-ISWS)
-03859

Streamflow and Runoff

**NSVERSE DISPERSION IN MEANDERING
NNELS,**
ada Centre for Inland Waters, Burlington
ario).
. Krishnappan, and Y. L. Lau.
Proceedings of the International Conference
Transport of Persistent Chemicals in Aquatic
systems held in Ottawa, Canada May 1-3,
. p I-17-I-23, 4 fig, 7 ref.

criptors: *Rivers, *River flow, *Meanders,
hematical studies, Numerical analysis,
spersion, Sedimentation, Sediment transport.

he use of dimensional analysis, an investiga-
of the effects of meander characteristics on
sverse dispersion was designed. The meander-
flow was allowed to carve out its own bed
ch was then solidified and dispersion tests
e conducted. Results indicated that there is a
large variation in flow depth across the chan-
and the distributions of tracer flux and trans-
e velocity are quite different from those ex-
ments in which flat bed are used. A numerical
hod was developed to solve the diffusion equa-
and to check different assumptions for the
ersion coefficient. (See also W77-03642)
ilton-ORNL)
7-03644

**E APPLICATION OF HYMO TO STUDY
EAS OF SOUTHWESTERN WYOMING FOR
RFACE RUNOFF AND SOIL LOSS ESTI-
TES,**
oming Univ., Laramie. Water Resources
earch Inst.
primary bibliographic entry see Field 4A.
7-03729

**OW AT GRADE-BREAK FROM MILD TO
EEP SLOPES,**
s Angeles Dept. of Water and Power, Calif.
primary bibliographic entry see Field 8B.
7-03746

**NOFF FILES FOR FLOOD HYDROGRAPH
MULATION,**
drocomp, Inc., Atlanta, Ga. Atlanta Regional
ice.
M. Lumb, and L. D. James.
rnal of the Hydraulics Division, American
ciety of Civil Engineers, Vol. 102, No. HY10,
oceedings Paper 12499, p 1515-1531, October
6. 2 fig, 3 tab, 28 ref.

scriptors: *Hydrograph analysis, *Georgia,
odel studies, Channel improvement, Detention
ervoirs, Flood peak, Hydrologic budget,
ods, Flood stages, Land use, Rainfall, Routing,
noff, Synthetic hydrology,
tersheds(Basins).
ntifiers: *Runoff files, Simulation analysis,
blic funds, Land use planning, Stanford
tershed model, Routing model, Storage routing.

system based on continuous streamflow simula-
n was developed for use in DeKalb County,
orgia, to obtain information on flood frequency
d flood hydrographs needed for land-use
nning and drainage system design. The Stan-
d Watershed Model was used to generate storm
iod runoff volumes at small time steps for three
l types and impervious areas. Runoff volumes,
ich include the effects of antecedent rainfall
d evapotranspiration, were stored on computer
s and used as inputs to a routing model.
Required inputs for the routing model included: (1) soil types and impervious areas for selection of runoff files; and (2) measurements of the drainage basin for channel and storage routing. (Roberts-ISWS)
W77-03748

LARGESCALE RIPPLES OF THE LOWER WABASH RIVER,
Northwestern Univ., Evanston, Ill. Dept. of Geological Sciences.
For primary bibliographic entry see Field 2J.
W77-03761

A MATHEMATICAL MODEL FOR SIMULATING WATER QUALITY UNDER NON-STEADY STATE CONDITIONS,
North Carolina State Univ., Raleigh. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W77-03831

HYBRID COMPUTER MODEL OF ST. VENANT EQUATIONS,
Department of Agriculture, Lethbridge (Alberta). Research Station.
M. Oosterveld, and K. Adamowski.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 102, No. HY10, Proceedings Paper 12467, p 1491-1501, October 1976. 6 fig, 12 ref, 2 append.

Descriptors: *Computer models, *Unsteady flow, *Hybrid computers, *Forecasting, Hydrodynamics, Hydrology, Methodology, Analytical techniques, Computer programs, Routing, Equations.
Identifiers: *St. Venant equations, Method of lines approximations, Characteristic normal equations.

Hybrid computers are an important tool in scientific and engineering problem solving, yet they have received little attention to date. The St. Venant equations were solved on a hybrid computer to demonstrate features of the system. The partial differential equations were reduced to ordinary ones by a continuous-space method of lines. An analog circuit was designed to solve the ordinary differential equations, with the digital performing initializing and storing duties. The computer model was calibrated and tested on data from a laboratory channel. Simulation experiments were run to test the performance of the model under steady and unsteady flow. It was concluded that the hybrid model has potential for reducing flow forecasting costs and computing time. (Singh-ISWS)
W77-03832

SOME PROBLEMS IN THE STUDY OF THE INUNDATION OF RIVER FLOOD PLAINS BY AEROSPACE METHODS,
For primary bibliographic entry see Field 4A.
W77-03847

MODEL OF THE FORMATION OF RAIN FLOODS IN THE RIONI RIVER BASIN AND ITS USE FOR SHORT-RANGE FORECASTS,
V. A. Bel'chikov.
Soviet Hydrology, Selected Papers, No. 1, p 40-44, 1975. 3 fig, 2 tab, 8 ref. Translated from Trudy Gidrometsentra SSSR, No. 131, p 49-59, 1975.

Descriptors: Model studies, *Floods, *Rainfall, *Mathematical models, *Rivers, *Runoff, *Forecasting, Flood forecasting, Watersheds(Basins), Hydrograph analysis, Hydrographs, Drainage, Evaporation, Precipitation(Atmospheric), Seepage, Infiltration, Rainfall-runoff relationships.
Identifiers: *USSR, *Rioni River basin(USSR).

V.I. Koren' and L.S. Kuchment have recently developed a technique for constructing mathematical models of runoff formation and have proposed a model of the formation of rain floods for small drainage basins. This proposed model takes into account the main characteristics of runoff formation and permits determining with sufficient reliability the parameters of specific drainage basins needed for computation. Reported herein were the results of the use of the model of Koren' and Kuchment for the formation of rain floods in the development of an operative system of short-range forecasting rain floods in the Rioni River basin upstream of Sakochakidze village. The model in question is fairly general and can be applied to various physiographic conditions. However, because of the great diversity of runoff formation conditions in different physiographic zones, processes that are significant for one drainage basin frequently may not be significant for another. Therefore, it is desirable to simplify the model and, in some cases, to modify the description of individual elementary processes for different physiographic zones. Large forecasting errors were observed, as a rule, when the spatial variability of the development of the flood formation process was great. Therefore, dividing a drainage basin into parts with uniform precipitation distribution, as investigated first, may prove to be more rational if information over shorter time intervals is available. (Sims-ISWS)
W77-03850

EQUALIZATION OF FLOW VARIATIONS IN COMBINED SEWERS,
Royal Inst. of Tech., Stockholm (Sweden). Dept. of Water Supply and Sewerage Engineering.
For primary bibliographic entry see Field 5D.
W77-03860

MAGNITUDE AND FREQUENCY OF FLOODS IN NEBRASKA,
Geological Survey, Lincoln, Nebr. Water Resources Div.
E. W. Beckman.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-260 842/As, Price codes: A07 in paper copy, A01 in microfiche. Water-Resources Investigations 76-109, October 1976. 128 p, 26 fig, 5 tab, 25 ref.

Descriptors: *Flood forecasting, *Flood frequency, *Flood peak, *Nebraska, Regression analysis, Equations, Graphical analysis, Regional flood, Natural streams, Flow control, Flow characteristics, River basins, Drainage area, Flood control, Rainfall-runoff relationships, Gaging stations.

Estimates of flood characteristics with recurrence intervals up to 100 years can be obtained at most sites in Nebraska by use of techniques presented. For natural-flow streams, equations and graphical solutions are based on regional relations between floods of a specific return period and selected basin characteristics. Nebraska was subdivided into five hydrologic regions by means of regressions and residuals from the regressions. Flood magnitude and frequency solution diagrams are presented for major controlled streams including the North Platte, South Platte, Platte, and Republican Rivers. Observed maximum flood peaks at 303 gaging stations with 13 or more years of record and significant peaks at 57 short-term stations and 31 miscellaneous sites are useful in designing flood-control works for maximum safety from flood damage. Comparison is made with maximum observed floods in the United States. (Woodard-USGS)
W77-03886

RESERVOIR-SYSTEM MODEL FOR THE WILLAMETTE RIVER BASIN, OREGON,
Geological Survey, Jackson, Miss. Water Resources Div.
J. O. Shearman.

Available from Branch of Distribution, USGS, 1200 S. Eads St. Arlington, Va 22202. Circular 715-H, 1976. 22 p, 13 fig, 10 tab, 10 ref.

Descriptors: *Mathematical models, *Reservoirs, *Streamflow, *Watershed management, *Oregon, River basins, Flow characteristics, Reservoir operation, Flow control, Natural flow, Model studies, Systems analysis, Simulation analysis.
Identifiers: *Willamette River basin(Oreg), *Reservoir-system models.

Evaluation of basin-development alternatives in terms of potential impacts on river quality for the Willamette River basin, Oregon, requires determining the low-flow characteristics of streamflow resulting from (1) unregulated (natural) conditions and (2) regulated (by existing or alternative reservoir system) conditions. This report describes (1) a method for estimating monthly streamflow for natural conditions and (2) the use of a reservoir-system model to simulate monthly streamflow for regulated conditions. A 4-year period (1970-73) is used to verify the applicability of the U.S. Army Corps of Engineers' HEC--3 reservoir-system model for the Willamette River basin. Modeling errors are computed as the differences between model results and observed streamflow at Salem, Oreg. These errors, although possibly subject to further reduction, are considered to be within reasonable limits. (Woodard-USGS)
W77-03891

HYDROLOGIC UNIT MAP--1974, STATE OF COLORADO.
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W77-03893

HYDROLOGIC EFFECTS OF HYPOTHETICAL EARTHQUAKE-CAUSED FLOODS BELOW JACKSON LAKE, NORTHWESTERN WYOMING,
Geological Survey, Cheyenne, Wyo. Water Resources Div.
For primary bibliographic entry see Field 8E.
W77-03895

RUNOFF REGULATION FOR HYDRO-POWER AND ITS EFFECT ON THE OCEAN ENVIRONMENT,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia).
H. J. A. Neu.
Hydrological Sciences Bulletin, Vol 21, No 3, p 433-444, September 1976. 9 fig, 1 tab, 9 ref.

Descriptors: *St Lawrence Seaway, *St Lawrence River, *Effects, *Canada, *Hydroelectric plants, Runoff, Oceans, Gulfs, Rivers, Estuaries, Heat budget, Seasonal, Discharge(Water), Environmental effects, Ecology, Balance of nature, Environment.
Identifiers: *Runoff regulation, *Hydro-power, *Gulf of St Lawrence.

It has not yet been recognized that modification of the natural seasonal discharge of rivers might result in significant consequences to the ecology of the adjacent marine environment. An example of such regulation is the St. Lawrence system, where, in order to optimize power production, large quantities of water from the spring runoff are retained in storage lakes and returned to the river during the low natural discharge period of autumn and winter. It is estimated that under present conditions, the spring and summer runoff at the entrance to the Gulf of St. Lawrence has been reduced by between one-third and one-half. This drastic alteration of the natural pattern of runoff causes significant changes in the physics and dynamics of the waters of the Estuary, Gulf, and adjacent coastal region. It was argued that such modifications produce a profound impact on the biological balance of the whole ecosystem as well as changes in the seasonal heat budget. The indications are that hydro-power, which has been considered a 'clean' resource, might prove to be less 'clean' than has been assumed. (Roberts-ISWS)
W77-03974

CHANGE IN SOME ELEMENTS OF THE RIVER REGIME IN THE LOWER OB' REGION UPON FLOW REGULATION (IN RELATION TO THE REDISTRIBUTION OF WATER RESOURCES IN THE CENTRAL REGION),
Akademiya Nauk SSSR Moscow. Institut Geografii.
For primary bibliographic entry see Field 4A.
W77-03989

COMPUTER MODELING OF ERODIBLE FLOOD CHANNELS AND DELTAS,
San Diego State Univ., Calif. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W77-03993

HYDRAULICS OF SLOPE EROSION BY OVERLAND FLOW,
Gifu Univ. (Japan). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W77-03994

MULTIVARIABLE FLOOD LEVEL FREQUENCY DISTRIBUTIONS,
Dillon (M. M.), Ltd., Toronto (Ontario).
For primary bibliographic entry see Field 8B.
W77-03996

2F. Groundwater

ANALYSIS OF ONE-DIMENSIONAL NON-DARCY VERTICAL INFILTRATION,
Ahmadu Bello Univ., Zaria (Nigeria). Dept. of Civil Engineering.
M. A. Gill.
Journal of Hydrology, Vol. 31, No. 1/2, p 1-11, September 1976. 6 fig, 9 ref.

Descriptors: *Porous media, *Infiltration, *Infiltration rates, *Mathematical studies, *Turbulent flow, *Transition flow, Analysis, Seepage, Laminar flow, Velocity, Groundwater recharge, Equations, Hydraulics, Fluid friction.

Turbulent and transitional regimes of vertically downward infiltrating flows through porous media were analyzed. Numerical results of some typical problems were presented and compared with results of laminar or Darcy infiltration. The general trend of non-Darcy infiltration was shown to be similar to that of Darcy infiltration. Turbulent infiltration in multi-layered porous materials was also described, and a specific case of infiltration in a two-layer porous medium was presented. (Adams-ISWS)
W77-03752

A SUBSURFACE STUDY OF THE MESA GEOTHERMAL ANOMALY, IMPERIAL VALLEY, CALIFORNIA,
Colorado Univ., Boulder. Dept. of Mechanical Engineering.
H. T. Black.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-247 082, Price codes: A04 in paper copy, A01 in microfiche. Report NSF-RA-N-75-126, May 5, 1975. 64 p, 14 fig, 1 tab, 34 ref. NSF AER74-03429.

Descriptors: *Geothermal studies, *Wells, *California, *Thermal water, Geology, Groundwater, Salinity, Temperature, Density, Porosity, Aquifers, Core logging, Permeability, Hydrology, Sands, Sandstones.
Identifiers: *Mesa Geothermal Anomaly(Ca
*Imperial Valley(Calif).

A subsurface study of the geological cha
teristics of the Mesa Anomaly was carried
based largely on well logs and histories of
geothermal wells in the area. The coincident
sistivity thermal and gravity anomalies are
nected with the presence of hot, saline water
vecting in a hydrothermally altered fractu
system. The system is apparently associated
the intersection of several near-vertical faults.
water rising from depth in the fault zone re
spreads laterally below the 2,500 ft level mer
with the regional northwestern groundwater
pattern. (Sims-ISWS)
W77-03771

**ANALYTIC SOLUTIONS FOR DRAWDOW
IN RECTANGULAR ARTESIAN AQUIFERS,**
Birmingham Univ. (England). Dept. of Civil
gineering.
For primary bibliographic entry see Field 4B.
W77-03854

**SUMMARY APPRAISALS OF THE NATIO
GROUND-WATER RESOURCES--ARKANS
WHITE-RED REGION,**
Geological Survey, Lakewood, Colo. W
Resources Div.
For primary bibliographic entry see Field 4B.
W77-03877

**GROUND-WATER RESOURCES OF THE H
LOMAN AIR FORCE BASE WELL-FI
AREA, 1967, NEW MEXICO,**
Geological Survey, Albuquerque, N. Mex. W
Resources Div.
For primary bibliographic entry see Field 4B.
W77-03878

**PRELIMINARY DIGITAL MODEL
GROUND-WATER FLOW IN THE MADIS
GROUP, POWEDER RIVER BASIN AND
JACENT AREAS, WYOMING, MONTA
SOUTH DAKOTA, NORTH DAKOTA,
NEBRASKA,**
Geological Survey, Lakewood, Colo. W
Resources Div.
L. F. Konikow.
Water-Resources Investigations 63-75, Janu
1976. 44 p, 14 fig, 6 plates, 6 tab, 25 ref.

Descriptors: *Groundwater movement, *M
studies, *Computer models, *Aquifer cha
teristics, *Water yield, Hydrogeology, Avail
water, Water utilization, Forecasting, Drawdo
Pumping, River basins, *Wyoming, Mont
South Dakota, North Dakota, Nebraska.
Identifiers: Powder River basin(Wyo).

A digital simulation model was used to analyze
gional ground-water flow in the Madison Gr
aquifer in the Powder River Basin in Montana
Wyoming and adjacent areas. Most recharge to
aquifer originates in or near the outcrop area
the Madison in the Bighorn Mountains and Bl
Hills, and most discharge occurs through spri
and wells. Flow through the aquifer in the mod
areas was approximately 200 cubic feet
second. The aquifer can probably sustain
creased ground-water withdrawals of up to sev
tens of cubic feet per second, but th
withdrawals probably would significantly lo
the potentiometric surface in the Madison aqu
in a large part of the basin. (Woodard-USGS)
W77-03882

**INTRODUCTION TO GROUND-WAT
HYDRAULICS--A PROGRAMED TEXT F
SELF-INSTRUCTION,**
Geological Survey, Reston, Va. Water Resour
Div.
For primary bibliographic entry see Field 8B.

03884

RIBUTION AND TREND OF NITRATE, ORIDE, AND TOTAL SOLIDS IN WATER HE MAGOTHY AQUIFER IN SOUTHEAST AU COUNTY, NEW YORK, FROM THE S THROUGH 1973,
ogical Survey, Mineola, N.Y. Water urces Div.
rimary bibliographic entry see Field 5B.
03887

UND-WATER LEVELS IN WYOMING,
ogical Survey, Cheyenne, Wyo. Water urces Div.
rimary bibliographic entry see Field 4B.
03888

UND-WATER RESOURCES AND GEOLO- OF JEFFERSON COUNTY, WISCONSIN,
ogical Survey, Madison, Wis. Water urces Div.
rimary bibliographic entry see Field 4B.
03889

THERMAL INVESTIGATIONS IN IDAHO, T 4, ISOTOPIC AND GEOCHEMICAL LSES OF WATER FROM THE BRUNEAU- ND VIEW AND WEISER AREAS, THWEST IDAHO,
ogical Survey, Reston, Va.; and Geological ey, Boise, Idaho.
rimary bibliographic entry see Field 1A.
03896

ERNATIONS OF FLOW CHARAC- ISTICS WITHIN GEOTHERMAL AREAS IDAL FORCES,
rado Univ., Boulder. Dept. of Mechanical En- ring.
rimary bibliographic entry see Field 2L.
03915

THQUAKE-RELATED CHANGE OF THE ROGEN ION CONCENTRATION (PH) IN UND WATERS,
demiya Nauk Uzbekskoi SSR, Tashkent. In- Seismologii.
rimary bibliographic entry see Field 2K.
03990

PING OF AQUIFER WITH VISCOELASTIC PERTIES,
ell Univ., Ithaca, N.Y. School of Civil and ronmental Engineering.
rimary bibliographic entry see Field 4B.
03995

ATURATED ZONE AND VERTICAL-FLOW MPONENTS IN DRAINING UNCONFINED MATIONS,
ingham Univ. (England). Dept. of Civil En- ring.
Streltsova.
nal of Hydrology, Vol 31, No 1/2, p 119-124, ember 1976. 1 fig, 18 ref.

riptors: *Unsaturated flow, *Drainage, ifers, Water table, Equations, Capillary e, Anisotropy, Transmissivity, Permeability, age coefficient, Drawdown, Diffusivity.
tifiers: *Vertical flow.

relation of the unsaturated zone flow com- nts and the vertical-flow components result- rom the variable head distribution across an fer thickness was considered in the general equation for unconfined formations. ocky-ISWS)
04000

AN APPROXIMATE SOLUTION FOR THE TRANSIENT INTERFACE IN A COASTAL AQUIFER,
Indian Inst. of Tech., Bombay.
V. N. Vappicha, and S. H. Nagaraja.
Journal of Hydrology, Vol. 31, No. 1/2, p 161-173, September 1976. 7 fig, 1 tab, 7 ref.

Descriptors: *Equations, *Aquifers, *Coasts, *Saline water-freshwater interfaces, Saline water intrusion, Mathematical models, Numerical analysis, Computers, Analog models, Groundwater movement, Dupuit-Forchheimer theory, Boundaries(Surfaces).
Identifiers: *Sea water wedge, *Coastal aquifers.

The transient interface phenomenon in sea water intrusion into coastal aquifers leads to the solution of nonlinear partial-differential equations involving large computer memory and computer time. Adopting the principle of quasi-steady state analysis, the basic equation was formulated as an ordinary differential equation of first order. The equation was solved analytically and numerically for three different boundary conditions. The solution was compared with experimental results from a viscous-flow analog model. The method led to an approximate, but simple, solution for a rough estimate of the rate of movement of the interface and length of intrusion. (Visocky-ISWS)
W77-04001

2G. Water In Soils

THE INFLUENCE OF SOIL CONDITIONERS ON THE LIQUID-SOLID CONTACT ANGLES OF SANDS AND SILT LOAMS,
Ghent Rijksuniversiteit (Belgium). Soil Physics, Soil Conditioning and Horticultural Soil Sciences Lab.; and Ghent Rijksuniversiteit (Belgium). Faculteit Landbouwwetenschappen.
R. Hartmann, H. Verplancke, and M. De Boodt.
Soil Science, Vol. 121, No. 6, p. 346-352, 1976. 5 fig., 5 tab., 17 ref.

Descriptors: *Wettability, *Soil physical properties, *Soil water movement, *Moisture content, Physical properties, Soils, Soil types, Silts, Loam, Sands, Soil properties, Soil physics, Pervious soils, Capillary action, Infiltration, Evaporation, Permeability, Soil moisture.
Identifiers: *Soil conditioners.

A study was conducted to compare and discuss some selected methods and to find a reliable method to provide a uniform basis for describing the changes in wettability or water repellency and related water transport phenomena after the addition of soil conditioners. The influence of soil conditioners on the liquid-solid contact angle, being an index of the hydrophyilic properties of the soil, was studied on sand and silt loam treated with three different soil conditioners: a bitumen emulsion, a polyvinyl alcohol solution, and a polyacrylmide solution. The results are presented. The bitumen emulsion gave a highly hydrophobic character to the sand as well as to the silt loam. Treatment with the polyvinyl alcohol and the polyacrylamide polymers had a different effect on both textures. Sandy soil became hydrophobic, whereas silt loam grew more hydrophilic. Further study is suggested before remedial treatments for improving infiltration into soil or reducing evaporation rate can be prescribed. (Jamail-Arizona).
W77-03626

SOIL MOISTURE RESPONSE TO SEVERAL LEVELS OF FOLIAGE REMOVAL ON TWO UTAH RANGES,
Oregon State Univ., Corvallis. Rangeland Resources Program.
J. C. Buckhouse, and G. B. Coltharp.
Journal of Range Management, Vol. 29, No. 4., p 313-315, July, 1976. 3 fig, 2 tab, 10 ref.

Descriptors: *Soil moisture, *Moisture content, *Grazing, *Range management, Watershed management, Moisture, Moisture availablility, Moisture stress, Stress, Ranges, Water loss, Soil water movement, Transpiration, Wheatgrasses, Soil moisture meters, Livestock, Water yield, *Utah.
Identifiers: *Foliage removal.

There has been considerable speculation concerning the effect of foliage removal on soil moisture regime. Some investigators suggest that foliage removal by livestock results in reduced transpiration rates, which in turn reduce soil water losses and thus create a potential for increased water yield. Other studies indicate that foliage removal may contribute to reduced infiltration, increased surface runoff, and increased evaporation from the soil surface. A study was conducted to investigate the effects of light, medium and heavy levels of foliage removal (simulated grazing) on the soil moisture of two grassland locations. The results presented indicate that extreme grazing resulting in complete denudation may promote increased soil moisture in some instances. This would not be an advisable practice, however, because of increased danger from flooding. It would seem from these studies that moderate or light levels of foliage removal will allow livestock use while not significantly changing soil moisture patterns. Further research is suggested into the relationship between livestock grazing and soil moisture. (Jamail-Arizona).
W77-03629

EFFECT OF MOISTURE CONTENT ON SOIL CONSISTENCY,
Cairo Univ., Giza (Egypt). Faculty of Agriculture.
M. F. Kandil, M. M. Abdalla, and W. A. Abo-Zied.
Egyptian Journal of Soil Science, Vol. 15, No. 1., p 19-30, 1975. 3 fig, 7 tab, 12 ref.

Descriptors: *Moisture content, *Soil moisture, *Soil structure, *Moisture tension, *Soil physics, Soils, Soil water, Soil texture, Soil types, Salts, Alkaline soils, Clays, Plant growth, Moisture, Porosity, Gypsum, Cation exchange, Cations, Calcium compounds, Soil surfaces.
Identifiers: *Soil consistency.

Soil consistency is one of the important soil characteristics affecting ease of tillage operations as well as other soil management practices. The moisture content of the soil is the main variable in the regulation of soil consistency. If soil moisture is too high, the soil will puddle easily; if it is too low, more power is needed to work the land. Experiments were carried out to investigate the factors influencing the effect of moisture on the consistency of Nile alluvium in order to bring about the proper moisture content for soil workability and its regulation. Several soil samples were analyzed, the breaking strength for each sample at different moisture contents determined, and the correlation coefficient calculated. At a given moisture content, the breaking strength value increases with clay content. Removal of excess salts is necessary for normal plant growth, but this also allows dispersion of the soil and increased hardness which can be regulated through the proper use of organic matter and/or calcium salts such as gypsum. (Jamail-Arizona)
W77-03631

RATES OF UREA HYDROLYSIS IN FIVE SOILS OF INDIA,
Haryana Agricultural Univ., Hissar, (India). Dept. of Soils.
S. D. Sankhayan, and U. C. Shukla.
Geoderma, Vol. 16, p 171-178, September, 1976. 4 fig, 2 tab, 17 ref.

Descriptors: *Ureas, *Hydrolysis, *Alkaline soils, *Soil moisture, Nitrogen compounds, Fertilizers, Soil types, Soils, Calcareous soils, Sands, Moisture content, Soil water movement, Loam,

Mathematical models, Organic soils, Conductivity, Soil chemical properties, Electrical conductance.
Identifiers: *India.

The rate of urea hydrolysis as affected by kind of soil, moisture levels and urea nitrogen levels was studied. Five bulk soil samples were collected and prepared for study in a greenhouse. Samples were analyzed for their mechanical composition, pH, electrical conductivity and organic carbon. Water holding capacity, calcium carbonate, and total nitrogen were ditermined; the rate of urea hydrolysis was then calculated and results presented. Most of the urea added to soil samples hydrolyzed within 24 hours. The rate of hydrolysis was faster at 40 percent of water holding capacity than at 60 percent, and was slower in soil samples with higher organic matter contents or electrical conductivity. The amounts of urea applied also influenced hydrolysis. The time required for urea hydrolysis increased with increases in the amount of urea applied, but not in the same proportion. Hydrolysis was found to follow a first order reaction. (Jamail-Arizona)
W77-03632

DESERTIFICATION AND THE SALINITY PROBLEM IN AUSTRALIA,
University of New England, Armidale (Australia). Dept.of Geography.
For primary bibliographic entry see Field 4C.
W77-03741

THE ORGANIC COMPONENT OF WIND-BLOWN SOIL AEROSOL AS A FUNCTION OF WIND VELOCITY,
Rutgers - The State Univ., New Brunswick, N.J.
S. T. Zenchelsky, A. C. Delany, and R. A. Pickett, II.
Soil Science, Vol 122, No 3, p 129-132, September 1976. 2 fig, 2 tab, 7 ref.

Descriptors: *Aerosols, *Erosion, *Winds, *Organic matter, Organic compounds, *Organic soils, Clays, Particle size, Sampling, Analysis, Chemical analysis, Soil analysis, Velocity, Dusts, Dust storms, *Texas.
Identifiers: *Wind erosion(Soils), Total organic carbon.

Windblown soil aerosol, generated during three dust storms in March 1974, was collected at 1.5 m above the surface in Plains, Texas, during periods of different wind velocities. A cascade impactor permitted separation into five size-fractions, four of them covering the range of particle radii from 0.21 through 3.4 micrometers. The total organic carbon (TOC) in each size range was determined by a wet oxidation method that measures the resultant CO2 in an infrared cell. For the aerosol, the mass distribution of TOC decreases with increasing particle size at all three of the wind velocities studied (7.3 m/sec, 9.3 m/sec, and 11.4 m/sec). The percentage of TOC in each size fraction decreases with increasing wind velocity although the corresponding particulate concentrations increase. Moreover, the aerosol is enriched in TOC compared with the bulk parent soil. The amount of enrichment is greatest for the smallest particle size. The enrichment factor, integrated over all sizes, varies between 1 and 10 depending upon wind velocity. These data are consistent with results obtained at 3.5 m using a different sampling and sizing method. Microscopic examination of the aerosol reveals vegetative residue in all fractions, although its contribution to the TOC appears to be small. (Sims-ISWS)
W77-03763

LABORATORY TECHNIQUES IN THE PREDICTION OF SOIL ERODIBILITY,
California Univ., Davis. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4D.
W77-03827

TIME OF PONDING--COMPARISON OF RESULTS OF THE PARLANGE SOLUTION WITH THE SMITH AND MEIN-LARSON MODELS,
Indian Inst. of Tech. Bombay. Dept. of Civil Engineering.
J. T. Panikar, and G. Nanjappa.
Journal of Hydrology, Vol. 31, No. 1/2, p 175-179, September 1976. 1 fig, 1 tab, 6 ref.

Descriptors: *Ponding, *Infiltration, Computers, *Model studies, Rainfall intensity, Diffusivity, Numerical analysis, Moisture content, Pore pressure, *Equations, *Simulation analysis, Soil moisture.
Identifiers: *Parlange equation, Relative rainfall, Smith's model.

Parlange presented an expression in 1972 to derive time to ponding after the beginning of a constant intensity rainfall on the surface of an initially dry soil. Smith, and later Mein and Larson, modeled infiltration during a steady rain. The results obtained with these models were compared with those from the Parlange equation for relative rainfall intensities varying from 1.002 to 1000. The digital computer simulation results indicated that both models yield results comparable to those from the Parlange equation for high values of relative rainfall, but for values less than 3, time to ponding was less with the models. (Singh-ISWS)
W77-03855

SOIL MOISTURE MOVEMENT BY TEMPERATURE GRADIENT,
Auckland Univ. (New Zealand). Dept. of Civil Engineering.
A. J. Raudkivi, and N. Van U'u.
Journal of the Geotechnical Engineering Division, American Society of Civil Engineers, Vol. 102, No. GT12, Proceedings Paper 12645, p 1225-1244, December 1976. 7 fig, 1 tab, 58 ref, 2 append.

Descriptors: *Diffusion, *Heat transfer, *Finite element analysis, Numerical analysis, *Soil moisture, Temperature, Testing, Thermocline, Movement, *Moisture content, *Model studies.
Identifiers: *Base courses, *Finite differences, Roadbeds, Adsorbed water, Vapor phase.

Results from a one-dimensional analytical model and from experiments showed that redistribution of moisture due to temperature gradients was maximum when initial saturation was about 20%. Increase in moisture at the cold end was on the order of 0.03 g/cu cm or 1.2% by weight after 3 days at a temperature gradient of 0.9C/cm, and about 80% of the increase occurred in the first day. At low moisture content, the adsorbed water was held firmly, relative to diffusion due to vapor concentration gradient, and only insignificant redistribution took place. A layer of fine, initially dry material absorbed water until all the adsorbed water requirements were satisfied. Since the vertical movement of moisture due to temperature gradients was found to be insignificant, any buildup of moisture in the basecourse must have resulted from other causes, either seepage through the top seal or lateral movement. For lateral movement, temperature gradients could have been important because movement from berms under the cooler seal at nighttime was followed by movement vertically down during the day, which possibly led to eventual moisture accumulation. (Roberts-ISWS)
W77-03861

PUMPING OF AQUIFER WITH VISCOELASTIC PROPERTIES,
Cornell Univ., Ithaca, N.Y. School of Civil and Environmental Engineering.
For primary bibliographic entry see Field 4B.
W77-03995

WEED CONTROL AND THE ENVIRONMEN (IN FRENCH),
Organisation Europeenne et Medterraneenne po la Protection des Plantes.
For primary bibliographic entry see Field 5B.
W77-04041

2H. Lakes

THE EFFECT OF THE CENTRAL ARIZO PROJECT ON THE THERMAL STRUCTU OF LAKE HAVASU,
Arizona Univ., Tucson. Dept. of Hydrology a Water Resources.
D. K. Kreamer.
Master of Science Thesis, 1976. 73 p, 19 fig, 3 t 19 ref, 4 append.

Descriptors: *thermal properties, *Therm stratification, *Lakes, *Water quali *Destratification, Temperature, Water pollutio Water pollution effects, Colorado River, Res voirs, Turbidity, Inflow, Stratification, *Arizo Simulation analysis, Model studies, Climatic da Water storage, Solar radiation.
Identifiers: *Lake Havasu(Ariz), *Central Arizo Project.

Thermal stratification is a layering of lake wat due to differences in temperature-dependent d sity. A temperature-stratification model develop by the U.S. Army Corps of Engineers, Hydrolo Engineering Center, was used to predict changes in the temperature profile of Lake Hav on the Colorado River near Parker, Arizona, t may occur with the withdrawal of Central Arizo Project water in the 1980's. Thermal stratificati of Lake Havasu has ramifications relating to water quality of the lake and its outlets. The co puter simulation model was calculated using m imum withdrawal conditions. Inputs for the p gram included monthly evaporation and precipi tion, monthly average air temperature, solar rad tion at the top of the atmosphere, water infl amount and temperature, water outflow amo and location, water temperature profiles, a physical reservoir data. The results are present and indicate that the stratification changes will of low magnitude. (Jamail-Arizona)
W77-03624

HEAVY METAL CONCENTRATIONS AND D TRIBUTIONS IN RIVER MOUTH SEDIMEN AROUND THE GREAT LAKES,
Toronto Univ. (Ontario). Dept. of Botany; a Toronto Univ. (Ontario). Inst. for Environmen Studies and Engineering.
For primary bibliographic entry see Field 5B.
W77-03650

ARTIFICIAL AND NATURAL LAKES,
Florida Univ., Gainesville. School of Law.
For primary bibliographic entry see Field 6E.
W77-03694

ESTIMATE OF THE SUITABILITY OF TELEV SION INFORMATION FROM METEOROLOG CAL METEOR SATELLITES FOR DETERMI ING ICE CONDITIONS IN LAKES AND RESE VOIRS,
For primary bibliographic entry see Field 2C.
W77-03765

THE EFFECTS OF AGRICULTURAL RUN-O AND SILTATION ON A NEW RECREATIONA LAKE,
Illinois State Univ., Normal. Dept. of Biologic Sciences; and Illinois State Univ., Normal. Dep of Chemistry.
For primary bibliographic entry see Field 5B.
W77-03766

ER POLLUTION INVESTIGATION: ROIT AND ST. CLAIR RIVERS.
onmental Control Technology Corp., Ann r, Mich.
rimary bibliographic entry see Field 5G.
03783

MPENDIUM OF LAKE AND RESERVOIR A COLLECTED BY THE NATIONAL ROPHICATION SURVEY IN THE THEAST AND NORTHCENTRAL UNITED ES.
c Northwest Environmental Research Lab., llis, Oreg.
rimary bibliographic entry see Field 5C.
03784

NVESTIGATION INTO THE EFFECTS OF ESTRY PLANTATIONS ON THE WATER LITY OF UPLAND RESERVOIRS IN THERN IRELAND,
try of Agriculture, Crumlin (Northern Ire- Freshwater Biological Investigation Unit.
rimary bibliographic entry see Field 5B.
03840

E ERIE TERRESTRIAL RADIATION,
nal Oceanic and Atmospheric Administra- Ann Arbor, Mich. Great Lakes Environmen- search Lab.
Derecki.
r Resources Research, Vol. 12, No. 5 p 979- October 1976. 1 fig, 4 tab, 9 ref.

riptors: *Radiation, *Lake Erie, *Air tem- ure, *Humidity, Water, Solar radiation, r pressure, Water temperature, Average, hly, Lakes.
ifiers: *Net back radiation, *Terrestrial ion, Incident radiation, Water surface tem- ure, Reflected radiation, Emitted radiation, age monthly radiation values.

strial or long-wave radiation over a body of consists of the atmospheric radiation, with nt and reflected components, and the radia- mitted by the water body. These three radia- components produce a net back radiation, an y loss from the water to the atmosphere. required data (air temperature, humidity, radiation, and water surface temperature) derived, and long-term (17 years) average hly radiation values were calculated for the Erie incident and reflected atmospheric ion and the radiation emitted by the water The net result, or the effective net back ion, averaged 100 Ly/d from 1952 to 1968. s-ISWS)
03858

MICAL AND PHYSICAL DATA FOR THE MING GORGE RESERVOIR AREA, UTAH WYOMING, 1973-75,
gical Survey, Salt Lake City, Utah.
rimary bibliographic entry see Field 7C.
03931

LYSIS OF POLLUTION FROM MARINE INES AND EFFECTS ON THE ENVIRON- T. SOUTHERN LAKES,
onmental Science and Engineering, Inc., sville, Fla.
rimary bibliographic entry see Field 5C.
03900

EPORT ON THE METHYLMERCURY ATION IN PAR POND,
gia Univ., Athens. Dept. of Zoology.
rimary bibliographic entry see Field 5B.
03954

SEICHES, CIRCULATION, AND STORM SURGES OF AN ICE-FREE LAKE WINNIPEG,
Canada Centre for Inland Waters, Burlington (Ontario).
P. F. Hamblin.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 10, p 2377-2391, October 1976. 17 fig, 13 ref.

Descriptors: *Seiches, *Storm surge, *Water circulation, *Lakes, *Canada, Model studies, Mathematical models, Winds, Equations, Circulation, Water levels, Physical properties, Storms, Limnology.
Identifiers: *Lake Winnipeg(Canada).

Predictions of numerical hydrodynamical models of seiches, steady circulation, and water level setup and time-dependent motions known as storm surges were compared to limited amounts of water level data during the ice-free season on Lake Winnipeg. Two-dimensional gravitational seiches were computed by minimizing an expression for the total energy. The fundamental inviscid period is 39 h, which is considered to be a maximum for any inland water body. Four higher modes of oscillation were detected in spectra of water level fluctuations at three stations on Lake Winnipeg. Frictional effects were shown to have appreciable influences on the seiches. Predicted water level setup had an asymmetrical distribution, with the largest excursions occurring in the southern basin. A number of observations of water level setup were in accordance with model predictions at Winnipeg Beach if a drag coefficient of 0.001 is assumed. Setup is relatively insensitive to vertical eddy diffusivities in the range 10-100 sq cm/s. A modeling strategy utilizing the previously obtained solutions for the free oscillations and for the steady state setup resulted in a simple prediction scheme for arbitrary forcing in time involving the convolution of the time history of the wind stress components with the response of the lake. Predicted storm surges were in reasonable agreement with two storm surges measured at two locations in the southern basin, considering the imperfect knowledge of the forcing obtained from winds at a single station in the northern basin. (Sims-ISWS)
W77-03987

UNSTEADY STRATIFIED CIRCULATION IN A CAVITY,
Cornell Univ., Ithaca, N. Y. School of Civil and Environmental Engineering.
D-L. Young, J. A. Liggett, and R. H. Gallagher.
Journal of the Engineering Mechanics Division, American Society of Civil Engineers, Vol. 102, No. EM6, Proceedings Paper No. 12643, p 1009-1023, December 1976. 11 fig, 15 ref, 2 append. NSF GK-23992.

Descriptors: *Circulation, *Density, *Thermal stratification, *Unsteady flow, *Finite element analysis, Model studies, Hydraulics, Lakes, Thermocline, Temperature, Winds, Numerical analysis, Stratification, Equations, Mathematical models.
Identifiers: *Lake circulation, Two dimensional flow, Wind shear.

A transient two-dimensional model with idealized topography (i.e., cross section of a rectangular lake) was examined using numerical models. The primary results define the behavior of the circulation and temperature distribution under a variety of circumstances. It was demonstrated that multiple circulation cells are likely to form in a basin with a broad and diffusive metalimnion, a strong and stable density stratification, and a modest wind stress. The present model was able to predict the formation, maintenance, and erosion of thermocline. The wind-driven current was observed to play a striking role in the development of thermocline. The current accelerates the establishment and contributes to the erosion of thermocline, which is in contrast to the one-dimensional pure diffusion model in which the circulation plays no role. (Adams-ISWS)
W77-04003

GLACIAL LAKE SEDIMENTATION, AUSTERDALSISEN, NORWAY,
Manchester Univ. (England). Dept. of Geography.
For primary bibliographic entry see Field 2J.
W77-04005

IRON TRANSPORT IN A LAKE TAHOE TRIBUTARY AND ITS POTENTIAL INFLUENCE UPON PHYTOPLANKTON GROWTH,
California Univ., Richmond. Sanitary Engineering Research Lab.
For primary bibliographic entry see Field 5B.
W77-04022

NITROGEN AND PHOSPHOROUS REMOVAL FROM LAKES BY FISH HARVEST,
British Columbia Dept. of Recreation and Conservation, Penticton. Fish and Wildlife Branch.
For primary bibliographic entry see Field 5G.
W77-04035

HYDROCARBONS IN A WILDERNESS LAKE,
Exxon Research and Engineering Co., Linden, N.J. Analytical and Information Div.
For primary bibliographic entry see Field 5B.
W77-04048

STUDY OF THE PRODUCTION PROCESS OF DAPHNIA LONGIREMIS SARS POPULATION FROM LAKE DALNEE BY MEANS OF A MATHEMATICAL MODEL, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Inst. of Evolutionary Physiology.
For primary bibliographic entry see Field 5C.
W77-04055

MICROBIAL PROCESSES OF PHENOL DEGRADATION IN THE VOLGA AND ITS RESERVOIRS, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
For primary bibliographic entry see Field 5C.
W77-04064

RADIOECOLOGICAL STUDY OF CHAROPHYTA, (IN RUSSIAN),
Akademiya Nauk Litovskoi, SSR, Vilnius. Inst. of Botany.
For primary bibliographic entry see Field 5C.
W77-04068

PRIMARY PRODUCTION OF GREEN FILAMENTOUS ALGAE FROM THE KIEV RESERVOIR, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
For primary bibliographic entry see Field 5C.
W77-04070

MEROMICTIC MECHANISMS IN A COASTAL LAKE, (IN FINNISH),
Abo Akademi, Turku (Finland). Inst. of Biology.
For primary bibliographic entry see Field 5C.
W77-04071

ODOROUS COMPOUNDS IN RAW WATER OF WATER SUPPLIES: IDENTIFICATION OF CAMPHOR AND P-METHYLACETOPHENONE, (IN JAPANESE),
Toyama Univ. (Japan). Research Inst. for Wakanyaku.
For primary bibliographic entry see Field 5A.
W77-04078

2I. Water In Plants

PHYSIOLOGICAL RESPONSES TO RAINFALL IN OPUNTIA BASILARIS (CACTACEAE),
California Univ., Riverside. Dept. of Biology.
S. R. Szarek, and I. P. Ting.
American Journal of Botany, Vol. 62, No. 6, p 602-609, 1975. 9 fig, 1 tab, 30 ref.

Descriptors: *Rainfall, *Cacti, *Desert plants, *Moisture deficit, *Moisture stress, Precipitation(Atmospheric), Stomata, Carbon dioxide, Organic acids, Arid lands, Photosynthesis, Leaves, Nocturnal, Diurnal, Water utilization, Droughts, Adaptation, Plant physiology.
Identifiers: *Crassulacean acid metabolism, Mesophyll resistance.

Crassulacean acid metabolism permits a reduced level of metabolic activity to persist throughout the year despite the cessation of atmospheric gas exchange during drought conditions. The adaptive significance of the maintenance of a reduced level of metabolic activity throughout periods of drought is investigated and the physiological response of a succulent to rainfall is reported. A field study was conducted on Opuntia basilaris. Transpiration resistance, radioactive carbon dioxide assimilation, boundry and stomatal resistance to carbon dioxide transfer, and plant and soil water potentials were determined. The results are presented. An immediate, marked response to small amounts of rainfall occurs in Opuntia basilaris despite previous drought conditions. The effect of rainfall is upon plant water potential. Nocturnal stomatal opening is initiated following rainfall, and stomata remain open during the daytime. Thus, crassulacean acid metabolism enables a rapid physiological response to small amounts of rainfall despite previous long periods of environmental drought conditions. (Jamail-Arizona)
W77-03622

ISOLATION AND CHARACTERIZATION OF DROUGHT TOLERANCE IN A GRAIN SORGHUM (SORGHUM BICOLOR (L) MOENCH) RANDOMMATING POPULATION,
Arizona Univ., Tucson. Dept. of Plant Sciences.
H. J. Hill, Jr.
Master of Science Thesis, 1976. 98 p, 9 ffig, 31 tab, 85 ref, 2 append.

Descriptors: *Grain sorghum, *Drought resistance, *Moisture stress, *Crop response, *Drought tolerance, Droughts, Plant physiology, Dehydration, Plant growth, Stomata, Transpiration, Crop production, Leaves, Sorghum, Irrigation, Plant morphology, Precipitation(Atmospheric), Rainfall, Agronomic crops, Stress, Moisture content.

Experiments were conducted on grain sorghum to : (1) evaluate the potential of a phenotypic selection procedure to isolate superior drought-tolerance genotypes; (2) to determine what morphological characteristics these superior drought-tolerant genotypes possess; and (3) to explore the relationship between transpiration and drought-tolerance in grain sorghum. A random-mating population of grain sorghum was divided, with one half of the population exposed to water stress and one half exposed to normal water conditions for three generations. Fifteen lines were selected from the lines developed in each of the two soil moisture regimes. All thirty genotypes were field tested under both normal water and water stress conditions. The lines selected under water stress conditions were significantly higher in grain yield, taller in height, earlier in maturity, and lower in leaf area of the top six leaves than the lines selected under normal moisture conditions. Similar results were obtained from a greenhouse study. The combined results of the greenhouse and field studies indicate that the ability to yield well under drought conditions may be a function of the inherent yield potential of a line, rather than drought-tolerance. (Jamail-Arizona)
W77-03623

YIELD RESPONSES OF TWO MAIZE CULTIVARS FOLLOWING SHORT PERIODS OF WATER STRESS AT TASSELING,
Buenos Aires Univ. (Argentina). Dept. of Ecology.
For primary bibliographic entry see Field 3F.
W77-03628

EFFECT OF WATER DEFICIT ON CARBON DIOXIDE EXCHANGE AND LEAF ELONGATION RATE OF PANCIUM MAXIMUM VAR. TRICHOGLUME,
Commonwealth Scientific and Industrial Research Organization, St. Lucia (Australia). Cunningham Lab.
M. M. Ludlow, and T. T. Ng.
Australian Journal of Plant Physiology, Vol. 3, No. 3, p. 401-413, May, 1976. 10 fig, 1 tab, 30 ref.

Descriptors: *Moisture stress, *Moisture deficit, *Moisture uptake, *Water utilization, Leaves, Moisture, Photosynthesis, Water loss, Stress, Moisture availability, Respiration, Stomata, *Grasses, *Pastures, Plant physiology, Energy conversion, Water shortage, Arid lands, Tropical regions, Subtropic, Semiarid climates.
Identifiers: Leaf water potential.

Seasonal water shortage is the greatest climatic limitation to the growth of Carbon 4 pasture grasses in tropical and subtropical areas. Even on soils at field capacity, transitory leaf water uptake deficits occur daily when atmospheric demand exceeds capacity of water uptake. Experiments were conducted to investigate the influence of water deficits on photosynthesis, growth, and chemical composition of a widely used tropical Carbon 4 pasture grass, Panicum maximum var. trichoglume. In addition, because field grown plants respond differently to water deficits than do plants grown under controlled conditions, the influence of nutrient supply, environmental conditions during growth, and stress history of the response of these processes to water deficits were investigated. The responses of carbon dioxide exchange and leaf expansion to the water deficits do not differ greatly from those of a wide range of herbaceous and woody Carbon 3 plants. They do, however, differ from those plants adapted to semiarid and arid areas, irrespective of whether they are Carbon 3 or Carbon 4. Thus, the Carbon 4 syndrome does not appear to be associated with a particular known response to water dificit which would confer an ecological advantage under hot, dry conditions. More research is suggested before the full significance of the Carbon 4 syndrome can be determined. (Jamail-Arizona).
W77-03630

MOISTURE USE EFFICIENCY OF DRYLAND CROPS AS INFLUENCED BY FERTILIZER USE, III. OILSEED CROPS,
Central Arid Zone Research Inst., Jodhpur (India). Dry Farming Research Main Centre.
For primary bibliographic entry see Field 3F.
W77-03634

ESTIMATING RELATIVE LEAF WATER CONTENT WITH A SIMPLE BETA GAUGE CALIBRATION,
Soil Conservation Service, Klamath Falls, Oreg.
For primary bibliographic entry see Field 7B.
W77-03635

EVAPORATIVE COOLING OF A PARTIALLY-WET AND TRANSPIRING LEAF-I. COMPUTER MODEL AND ITS EVALUATION USING WIND-TUNNEL EXPERIMENTS,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
For primary bibliographic entry see Field 2D.
W77-03757

EVAPORATIVE COOLING OF A PARTIALL WET AND TRANSPIRING LEAF-II. SIM LATED EFFECT OF VARIATIONS IN E VIRONMENTAL CONDITIONS, LEAF PR PERTIES, AND SURFACE WATER CHARA TERISTICS,
North Carolina State Univ., Raleigh. Dept. Biological and Agricultural Engineering.
For primary bibliographic entry see Field 2D.
W77-03758

THE CEPHALOPODA. PART I: OEGOPSI PART II: MYOPSIDA, OCTOPODA,
For primary bibliographic entry see Field 2L.
W77-03776

2J. Erosion and Sedimentation

RAINFALL EROSIVITY ANALYSIS OF SO CONSERVATION RESEARCH CENTI VASAD(GUJARAT),
Guiarat Soil Conservation Research, Demonst tion and Training Centre, Vasad (India).
For primary bibliographic entry see Field 4D.
W77-03627

PROCEEDINGS OF THE INTERNATION CONFERENCE ON TRANSPORT OF PE SISTENT CHEMICALS IN AQUAT ECOSYSTEMS.
National Research Council of Canda, Otta (Ontario).
For primary bibliographic entry see Field 5B.
W77-03642

THE DISTRIBUTION AND TRANSPORT MERCURY IN THE SEDIMENTS OF THE LA RENTIAN GREAT LAKES SYSTEM,
Canada Centre for Inland Waters,Burling (Ontario).
For primary bibliographic entry see Field 5B.
W77-03643

TRANSVERSE DISPERSION IN MEANDERI CHANNELS,
Canada Centre for Inland Waters, Burling (Ontario).
For primary bibliographic entry see Field 2E.
W77-03644

THE DISTRIBUTION AND TRANSPORT BED SEDIMENTS AND PERSISTENT POLL TANTS IN THE OTTAWA RIVER, CANADA,
Ottawa Univ. (Ontario). Dept. of Geology.
For primary bibliographic entry see Field 5B.
W77-03645

THE ROLE OF FLOCCULATION IN T TRANSPORT OF PARTICULATE POLL TANTS IN THE MARINE ENVIRONMENT,
Bedford Inst., of Oceanography, Dartmo (Nova Scotia). Atlantic Oceanographic Lab.
For primary bibliographic entry see Field 5B.
W77-03646

MERCURY TRANSPORT BY BED SEDIME MOVEMENTS,
Ottawa Univ. (Ontario). Dept. of Civil Engine ing.
For primary bibliographic entry see Field 5B.
W77-03647

PHYSICAL EXCHANGE IN STREAM ECOL GY STUDIES,
Ottawa Univ. (Ontario). Dept. of Civil Engine ing.

. H. Gowda.
Proceedings of the International Conference Transport of Persistent Chemicals in Aquatic Systems held in Ottawa, Canada May 1-3, . p I-53-I-58, 1 fig, 2 tab, 2 append, 15 ref.

criptors: *Ecology, *Flow, River flow, amflow, Flocculation, Particle size, Mixing, usion, Sediment transport.

rief review of the theoretical aspects of physi- exchange is presented with particular emphasis he importance of the fundamental parameters low in ecology studies. The significance of the culation phenomenon in the Ottawa River is yzed. The analysis for the river as a whole ws that the Brownian motion is mainly respon- e for the aggregation of particles in the river re the particles are of the size of micron. How- , in shore regions, the flocculation nomenon may be more significant. (See also 7-03642) (Chilton-ORNL)
7-03648

AVY METAL CONCENTRATIONS AND DIS- BUTIONS IN RIVER MOUTH SEDIMENTS OUND THE GREAT LAKES,
onto Univ. (Ontario). Dept. of Botany; and onto Univ. (Ontario). Inst. for Environmental dies and Engineering.
primary bibliographic entry see Field 5B.
7-03650

AVY METAL POLLUTANTS IN THE SEDI- NTS OF THE RHONE RIVER,
neva Univ. (Switzerland). Dept. of Earth nces.
primary bibliographic entry see Field 5B.
7-03651

ANSPORT OF SOME ORGANOCHLORINES B. C. WATERS,
on Fraser Univ., Burnaby (British Columbia). t. of Biological Sciences.
primary bibliographic entry see Field 5B.
7-03653

AVY METALS IN THE LOWER MISSISSIP-

higan Univ., Ann Arbor. Dept. of Environ- tal and Industrial Health.
primary bibliographic entry see Field 5B.
7-03654

SPENDED SOLIDS AND VELOCITY DIS- IBUTIONS IN THE OTTAWA RIVER,
awa Univ. (Ontario). Dept. of Civil Engineer-

G. Warnock, and S. I. Khan.
Proceedings of the International Conference Transport of Persistent Chemicals in Aquatic systems held in Ottawa, Canada May 1-3, 4. p I-99-I-104, 9 fig.

criptors: *Sediment transport, Sedimentation, spended solids, Current meters, Velocity, nada, Rivers, *Measurement.
ntifiers: *Ottawa River(Canada).

ocity measurements were made over a five r period with a rotating-type meter which mea- es velocity in a horizontal plane. The variation velocity with depth (plotted in a non-dimen- al form) was used to estimate depth-averaged ocity from surface velocity measurements. A t survey method was found to be satisfactory determining transverse distributions of mean ocity (in the vertical) reasonably well. Measure- nts of suspended solids showed that values e usually high in spring, lower in the late mer and somewhat higher in the fall. Little iation of suspended solids was found with th although some lateral variations (caused by tributary inflows or local effluents) were observed. (See also W77-03642) (Chilton-ORNL)
W77-03655

ADSORPTION OF C14-DDT TO PARTICLE SURFACES,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Marine Ecology Lab.
For primary bibliographic entry see Field 5B.
W77-03658

TRANSPORT AND DISTRIBUTION OF MERCURY IN SEDIMENTS,
Battelle Columbus Labs., Ohio.
For primary bibliographic entry see Field 5B.
W77-03669

INTERACTION BETWEEN AQUATIC PLANTS AND RIVER BED SEDIMENTS IN THE UPTAKE OF MERCURY FROM FLOWING WATER,
National Research Council of Canada, Ottawa(Ontario). Div. of Biological Sciences.
For primary bibliographic entry see Field 5C.
W77-03671

LEAD TRANSPORT IN A RIVER ECOSYSTEM,
Illinois Univ. at Urbana-Champain. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W77-03672

SEGMENTS OF A VICIOUS CIRCLE: LAND DEGRADATION AND WATER RESOURCES,
Arizona Univ., Tucson. Dept. of Soils, Water, and Engineering.
For primary bibliographic entry see Field 4C.
W77-03740

LARGESCALE RIPPLES OF THE LOWER WABASH RIVER,
Northwestern Univ., Evanston, Ill. Dept. of Geological Sciences.
R. G. Jackson, II.
Sedimentology, Vol 23, No 5, p 593-623, October 1976. 19 fig, 2 tab, 43 ref.

Descriptors: *River beds, *Geomorphology, *On-site investigations, *Illinois, *Indiana, Streambeds, Topography, Bed forms, Beds, Rivers, Channel morphology, Alluvial channels, Dunes, Sand bars, Sand waves, On-site data collections, Velocity, Currents(Water), Movement.
Identifiers: *Wabash River(Ill).

Large-scale ripples in the meandering lower Wabash River of Illinois and Indiana include scroll bars and three dunelike bed forms (dunes, sand waves, and transverse bars). Scroll bars are lobate crested, asymmetrical in streamwise vertical profile, usually solitary, and oriented approximately normal to local channel strike. They form by passive flow expansion downchannel from locally emergent topographic highs, face and lie near inner banks of meander bends, enjoy a high preservation potential as leveelike ridges of ridge-and-swale topography, and migrate only during relatively low stream discharges when water depth over bar crests is less than 0.5 m. Dunes correspond to dunes of the flow-regime classification and rarely are solitary or superimposed. Sand waves may be symmetrical or asymmetrical, are always superimposed by dunes, occur in depths greater than 4 m and bed material coarser than 1 mm mean size, and develop at bankful and flood flows. Transverse bars migrate in depths less than 5 m in straight reaches and near inner banks of bends. The omnipresence of dunes upon stoss sides of sand waves confirms the existence of an equilibrium superimposition of dunelike large-scale ripples. Depth-velocity-size diagrams appear to be a valid representation of empirical stability fields of dune-like large-scale ripples in deep, unsteady, nonuniform aqueous flows. Dune stratification displays (1) large-scale trough cross-strata, (2) thinning of sets as bed material size increases, and (3) an orientation within 20 deg of local channel strike. Transverse bars show avalanche sets up to 2 m thick with reactivation surfaces. Scroll bars display thick avalanche sets separated by reactivation structures consisting of erratically oriented small-scale trough cross-strata. Avalanche sets of scroll bars and of transverse bars are oriented respectively 50-150 deg from and within 50 deg of local channel strike. (Humphreys-ISWS)
W77-03761

A RECONNAISSANCE OF THE RECENT SEDIMENTS OF THE RANNS OF KUTCH, INDIA,
Imperial Coll. of Science and Technology, London (England). Dept. of Geology.
For primary bibliographic entry see Field 2L.
W77-03762

THE ORGANIC COMPONENT OF WIND-BLOWN SOIL AEROSOL AS A FUNCTION OF WIND VELOCITY,
Rutgers - The State Univ., New Brunswick, N.J.
For primary bibliographic entry see Field 2G.
W77-03763

LABORATORY TECHNIQUES IN THE PREDICTION OF SOIL ERODIBILITY,
California Univ., Davis. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4D.
W77-03827

STABILITY OF CHANNEL BEDS BY AMORING,
Agricultural Research Service, Oxford, Miss. Sedimentation Lab.
For primary bibliographic entry see Field 8B.
W77-03836

AN EVALUATION OF SURFACE-MINE SPOILS AREA RESTORATION IN WYOMING USING RAINFALL SIMULATION,
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-03892

COMPUTER MODELING OF ERODIBLE FLOOD CHANNELS AND DELTAS,
San Diego State Univ., Calif. Dept. of Civil Engineering.
H. H. Chang, and J. C. Hill.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 102, No HY10, Proceedings Paper 12485, p 1461-1477, October 1976. 13 fig, 11 ref, 2 append.

Descriptors: *Channels, *Computer models, *Deltas, *Erosion, *Rivers, Flood control, Hydraulics, Sedimentation, Oceans, Reservoirs, Flow, Model studies.

The existing computer program for water-surface computation and delineation of the flood limit was extended to include the effect of channel deformation during a flood. In the new program, the unsteady flow was approximated by successive temporal steady conditions; the change in channel boundary was corrected at each time step. The new computer program was applied to obtain the progressive changes of the channel boundary and water-surface profile during a flood as a result of erosion and sedimentation. By imposing an additional condition for the delta, another computer program was developed to compute the progressive growth of the delta at the river mouth and the variation of the delta stream pattern. (Bhowmik-ISWS)
W77-03993

HYDRAULICS OF SLOPE EROSION BY OVERLAND FLOW,
Gifu Univ. (Japan). Dept. of Civil Engineering.
S. Komura.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 102, No HY10, Proceedings Paper 12489, p 1573-1586, October 1976. 8 fig, 2 tab, 14 ref, 2 append.

Descriptors: *Erosion, *Overland flow, *Sedimentation, *Flow, *Soil erosion, *Rill erosion, *Rainfall, Sediments, Sheet erosion, Hydraulics, Gullies, Slopes.

General equations of soil erosion by rainfall and overland flow were analytically derived by using equations of motion and continuity for sediment transport, dynamic and continuity equations for spatially varied flow with rainfall, and equations of boundary shear stress subject to rainfall. Computational equations for predicting soil erosion rates were developed from the general equations obtained. To demonstrate the applicability of computational equations, computed results were compared with previously published data on soil erosion. (Bhowmik-ISWS)
W77-03994

STOCHASTIC MODELS OF SEDIMENT MOTION ON FLAT BED,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
C. S. Hung, and H. W. Shen.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 102, No HY12, Proceedings Paper 12639, p 1745-1759, December 1976. 5 fig, 2 tab, 3 ref, 3 append. NSF ENG74-03037.

Descriptors: *Sediment transport, *Model studies, *Bed load, *Stochastic processes, Channels, Hydraulics, Probability, Sediment load, Alluvial channels, Theoretical analysis, Equations.
Identifiers: *Hazard function, Sediment movement, Longitudinal sediment movement, Flat bed, Resting period, Moving period, Step length.

Plausible stochastic models for resting period, moving period, and step length were constructed to describe the longitudinal sediment motion on a flat bed under steady uniform flows. Resting period was found to be compound exponentially distributed (J-shaped) with a random hazard rate which has a monotonically decreasing probability density function. Step length and resting period were found to be exponentially distributed (J-shaped) when the flow is slow. They possess bell-shaped probability density functions when the flow is faster, and they have weak associations with the preceding resting period. (Lee-ISWS)
W77-03997

ROLLERS AND RIPPLES IN SAND, STREAMS AND SKY: RHYTHMIC ALTERATION OF TRANSVERSE AND LONGITUDINAL VORTICES IN THREE ORDERS,
Texas Univ. at Austin.
R. L. Folk.
Sedimentology, Vol 23, No 5, p 649-669, October 1976. 9 fig, 43 ref.

Descriptors: *Bed forms, *Sedimentology, *Sediment transport, *Sand waves, Model studies, Circulation, Water circulation, Movement, Sediments, Eddies, Flow, Vortices, Currents(Water), Sand bars, Ripple marks, Dunes.
Identifiers: *Hypothesis, Helicoidal flow.

Sediment ripples are caused by systematically spaced, transverse roller vortex systems in a moving fluid undergoing shear. With greater shear, these transverse rollers change over into longitudinal (helicoidal) vortices. This is the basic cause for the change from so-called 'lower flow regime' conditions to 'upper flow regime' conditions. All characteristics of these two regimes (sediment transport rate, bed form, sedimentary structures) are logically explained by attributing them to change in type of vortex system. For currents depositing sediments, there are three orders of magnitude of vortices, with each order beginning with transverse rollers and passing through festoon to longitudinal rollers. A chaos zone (antidunes) ensues, followed by resumption of transverse rollers that are five to ten times as large as those in the previous order. Features of river sediments, marine sands, turbidites, desert sand dunes, sky, and stars are satisfactorily explained by this model. (Humphreys-ISWS)
W77-03998

THE PRODUCTION AND RECOGNITION OF AEOLIAN FEATURES ON SAND GRAINS BY SILT ABRASION,
Queens Coll., Flushing, N.Y. Dept. of Earth and Environmental Sciences.
W. M. Nieter, and D. H. Krinsley.
Sedimentology, Vol 23, No 5, p 713-720, October 1976. 7 fig, 1 tab, 15 ref.

Descriptors: *Laboratory tests, *Aeolian soils, *Loess, *New York, Analytical techniques, Wind erosion, Glacial drift, Abrasion, Evaluation, Soil tests, Testing procedures, Measurement, Soil surfaces, Sands, Silts.
Identifiers: *Long Island(NY).

Several size fractions of natural loess from Long Island, New York, including sand and ventifacts, were studied with the scanning electron microscope to determine if distinguishing surface features could be found. Long Island loess compares very closely to descriptions of a number of European loess deposits except for the inclusion of carbonate not found on Long Island. Ventifact and sand grain surfaces were experimentally prepared using natural loess as an abrasive agent, and they compared well with those surfaces found in the natural materials. Given favorable circumstances, it is possible, via scanning electron microscopy, to distinguish surface features created by aeolian action in loess deposits and associated materials. (Humphreys-ISWS)
W77-03999

GLACIAL LAKE SEDIMENTATION, AUSTERDALSISEN, NORWAY,
Manchester Univ. (England). Dept. of Geography.
W. H. Theakstone.
Sedimentology, Vol. 23, No. 5, p 671-688, October 1976. 9 fig, 36 ref.

Descriptors: *Glacial sediments, *Lakes, *Glaciology, *On-site investigations, Foreign countries, Glaciers, Glacial drift, Sediments, Geomorphology, Deltas, Sedimentology, Beds, Silts, Deposition(Sediments), Lake beds.
Identifiers: *Norway(Austerdalsisen).

Sediments deposited in a lake at the front of a glacier in the Svartisen area, Norway, were studied between 1957 and 1974. Until 1959, they were almost completely covered by an outwash plain (sandur), but subsequent erosion has exposed glacial lake sediments more than 70 m deep within a rock basin about 2.5 km long and 1 km wide. The basin was filled by sand and silt carried from beneath the glacier Austerdalsisen by two rivers, each of which deposited a delta in the lake. As the deltas advanced, laminated pro-delta silt was covered by cross-beds of fine sand and silt and by near-horizontal sheets of fine sediments laid down between the delta-fronts and the distal end of the rock basin. Although both slumping and loading caused minor disturbance of sediments at the lake floor, deformation was of local significance only. Movement of a mass of sediment across the floor, probably triggered by a 'seismic event' related to movement of the glacier or to calving at the floating tongue, created a recumbent fold in laminated sand and silt, but transfer of sediment over the lake bed was rare once it had been deposited. Varves are not common at Austerdalsisen, indic ing that water temperature, lake chemistry, variations of water and sediment discharge fr the glacier were unfavorable for their formati rhythmic deposition from density flows of se ments carried from beneath the glacier rarely curred within the Austerdalsisen ba (Humphreys-ISWS)
W77-04005

INTENSITY OF RAINFALL IN CLERMON FERRAND, (IN FRENCH),
For primary bibliographic entry see Field 2B.
W77-04032

MOLECULAR TEST FOR OIL POLLUTION SURFACE SEDIMENTS,
Strasbourg Univ. (France). Institut de Chimie.
For primary bibliographic entry see Field 5B.
W77-04058

2K. Chemical Processes

DYNAMICS OF INTERACTION OF CATIO AND FULVIC ACID,
Carleton Univ., Ottawa (Ontario). Dept. Chemistry.
C. H. Langford, and D. S. Gamble.
In: Proceedings of the International Confere on Transport of Persistent Chemicals in Aqu Ecosystems held in Ottawa, Canada May 1974. p II-37-II-39, 13 ref.

Descriptors: Chemistry, *Cation adsorpti Chemical reactions, Ions, *Cations, *Fulvic aci Polyelectrolytes.
Identifiers: Aqueous transport(Metal ions), *M ions.

The aqueous transport of metal ions as it invol the related soluble fulvic acid complexes discussed. For the experiment the metal ion u is Fe(3+) and the fulvic acid is a polyelectrolyt a molecular weight of approximately 900 with proximately 3 m eq of phenolic sites ortho to boxyl groups per gram. Results indicated that rate of fulvic acid binding of Fe(3+) is simila that for the simple ligand, sulfosalicylic acid. also W77-03642) (Chilton-ORNL)
W77-03662

ANALYTIC EQUATION OF STATE FOR S WATER,
Scripps Institution of Oceanography, San Die Calif. Marine Physical Lab.
For primary bibliographic entry see Field 1B.
W77-03770

SEASONAL VARIATIONS OF CHEMIC CONSTITUENTS IN ANNUAL LAYERS GREENLAND DEEP ICE DEPOSITS,
State Univ. of New York at Buffalo. Dept. Earth Sciences.
For primary bibliographic entry see Field 2C.
W77-03773

SIMULTANEOUS DETERMINATION TOTAL, NON-CARBONATE AND CARBONA WATER HARDNESS BY DIRECT POT TIOMETRY,
Canada Centre for Insland Waters, Burling (Ontario).
For primary bibliographic entry see Field 5A.
W77-03780

DETERMINATION OF ARSENIC, TUNGST AND ANTIMONY IN NATURAL WATERS NEUTRON ACTIVATION AND INORGAN ION EXCHANGE,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 5A.

UNIV. OF ILL. URBANA-CHAMPAIGN

03788

UND-WATER RESOURCES OF THE HOL-AN AIR FORCE BASE WELL-FIELD A, 1967, NEW MEXICO,
ogical Survey, Albuquerque, N. Mex. Water urces Div.
rimary bibliographic entry see Field 4B.
03878

RIBUTION AND TREND OF NITRATE, ORIDE, AND TOTAL SOLIDS IN WATER HE MAGOTHY AQUIFER IN SOUTHEAST SAU COUNTY, NEW YORK, FROM THE S THROUGH 1973,
ogical Survey, Mineola, N.Y. Water urces Div.
rimary bibliographic entry see Field 5B.
03887

UND-WATER RESOURCES AND GEOLO-OF JEFFERSON COUNTY, WISCONSIN,
ogical Survey, Madison, Wis. Water urces Div.
rimary bibliographic entry see Field 4B.
03889

THERMAL INVESTIGATIONS IN IDAHO, T 4, ISOTOPIC AND GEOCHEMICAL LSES OF WATER FROM THE BRUNEAU-ND VIEW AND WEISER AREAS, THWEST IDAHO,
ogical Survey, Reston, Va.; and Geological ey, Boise, Idaho.
rimary bibliographic entry see Field 1A.
03896

THQUAKE-RELATED CHANGE OF THE ROGEN ION CONCENTRATION (PH) IN UND WATERS,
lemiya Nauk Uzbekskoi SSR, Tashkent. In-Seismologii.
Mavlyanov, S. E. Ergashev, and A. N. nkhodzhayev.
et Hydrology, Selected Papers, No. 2, p 74, ember 1975. 1 fig. Translated from Uzbekskiy ogicheskiy Zhurnal, No. 1, p 3-4, 1975.

riptors: *Earthquakes, *Groundwater, drogen ion concentration, Aquifers, Foreign tries, Wells, Foreign research, Water wells, ogy, Earthquake engineering.
tifiers: *USSR.

on observations of the variation in the chemi-omposition of groundwaters in deep aquifers e Tashkent artesian basin showed a change in n two wells during an earthquake. According iicro-seismic investigations, the earthquake enter was near the village of Abaybazar, west Tashkent in Southern Kazakhstan. From yses of the two wells, it was concluded that pH in deep aquifers decreases sharply before arthquake. After an earthquake, the pH rises ply to a value above or equal to the initial e. The pre-earthquake background pH in deep fers decreases sharply as elastic stresses accu-te and change the existing alkaline medium. , it was decided that the variations of the pH e two observed wells are associated with the ybazar earthquake of February 9, 1971. The of groundwaters is one of their important acteristics, and its decrease testifies to a ge in hydrogeochemical conditions. Further stigations will permit establishing more relia-relations between the variations in pH and notectonic activity of the region. (Sims-ISWS)
-03990

L PILE LEACHATE - QUANTITY AND LITY CHARACTERISTICS,
ard and Anderson, Auburn, N.Y.
rimary bibliographic entry see Field 5B.

W77-03992

2L. Estuaries

THE ROLE OF FLOCCULATION IN THE TRANSPORT OF PARTICULATE POLLUTANTS IN THE MARINE ENVIRONMENT,
Bedford Inst., of Oceanography, Dartmouth (Nova Scotia). Atlantic Oceanographic Lab.
For primary bibliographic entry see Field 5B.
W77-03646

GEOCHEMICAL INTERACTION IN THE RECENTLY INDUSTRIALIZED STRAIT OF CANSO,
Bedford Inst., Dartmouth (Nova Scotia). Atlantic Geoscience Center; and Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Environmental Marine Geology.
For primary bibliographic entry see Field 5B.
W77-03649

TRACE METAL POLLUTION FROM A METROPOLITAN AREA: SOURCES AND ACCUMULATION IN THE LOWER FRASER RIVER AND ESTUARY,
British Columbia Univ., Vancouver. Westwater Research Centre.
For primary bibliographic entry see Field 5B.
W77-03652

CHLORINATED HYDROCARBONS IN COASTAL MARINE ECOSYSTEMS,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 5C.
W77-03661

THE ROLE OF TIN IN BACTERIAL METHYLATION OF MERCURY,
Maryland Univ., College Park. Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W77-03668

BACTERIAL MOBILIZATION OF MERCURY IN CHESAPEAKE BAY,
Maryland Univ., College Park. Dept. of Microbiology.
For primary bibliographic entry see Field 5C.
W77-03670

MATHEMATICAL MODELING OF ESTUARIAL ECOSYSTEMS,
California Univ., Davis. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W77-03682

LEGAL SYMPOSIUM ON WETLANDS: AN EXECUTIVE SUMMARY, NOVEMBER 1974,
Virginia Inst. of Marine Science, Gloucester Point.
For primary bibliographic entry see Field 6E.
W77-03685

THE CALIFORNIA COASTAL PLAN (A SYMPOSIUM).
For primary bibliographic entry see Field 6E.
W77-03688

OWNERSHIP OF SUBMERGED LANDS IN FLORIDA,
Miami Univ., Coral Gables, Fla. School of Law.
For primary bibliographic entry see Field 6E.
W77-03695

LEGAL PROTECTION FOR FLORIDA WETLANDS,
Florida Univ., Gainesville. School of Law.
For primary bibliographic entry see Field 6E.
W77-03696

LEGAL ASPECTS OF COASTAL ZONE MANAGEMENT IN ESCAMBIA AND SANTA ROSA COUNTIES, FLORIDA ('ESCAROSA'),
Miami Univ., Fla. School of Law.
For primary bibliographic entry see Field 6E.
W77-03697

COASTAL ZONE MANAGEMENT IN FLORIDA,
Florida Univ., Gainesville. School of Law.
For primary bibliographic entry see Field 6E.
W77-03699

A MATHEMATICAL MODEL FOR WATER QUALITY EVALUATION IN THE SOUTH CAROLINA GRAND STAND,
Clemson Univ., Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W77-03731

A NUMERICAL INVESTIGATION OF THE CIRCULATION IN THE NORWEGIAN SEA,
Kingston Polytechnic, Kingston upon Thames (England). School of Mathematics.
A. Creegan.
Tellus, Vol. 28, No. 5, p 451-459, 1976. 11 fig, 9 ref.

Descriptors: *Oceans, *Water circulation, *Model studies, Foreign countries, Circulation, Ocean circulation, Movement, Numerical analysis, Finite element analysis, Approximation method, Equations, Topography, Analytical techniques, Winds, Stress.
Identifiers: *Norwegian Sea, Wind effects, Two layer model.

A numerical model of the Norwegian Sea was developed with the vertical structure modeled by two moving layers. Both the coastline and topography were represented by the finite difference formulation. From such data as is readily available, a preliminary study was made of the relative effects of topography, wind-driving, and interaction with the surrounding sea areas in determining the large-scale circulation of the Norwegian Sea. The following conclusions about the relative importance of the driving forces based on the results of this model were proposed: The observed circulation is difficult to explain in a wholly wind-driven flow; absence or reversal of the main currents is not observed, although clearly such a situation could well occur if anticyclonic stresses occurred for more than a few weeks. The average effect of the wind is to produce a general cyclonic circulation within the Norwegian Sea. For any given stress distribution, the topography serves to split the resultant circulation into two gyres, with that in the Norwegian Basin being the more pronounced. Inflow effects cannot be neglected when considering driving mechanisms. To progress further, more accurate modeling is required, particularly with regard to the details of the exchange with the Atlantic and inclusion of the East Greenland Polar Current. There is a clear implication that the effect of inflow is to establish a more permanent current system than could be expected from the wind stress alone. (Humphreys-ISWS)
W77-03750

MASS AND SALT TRANSFERS AND HALOCLINE DEPTHS IN AN ESTUARY,
Johns Hopkins Univ., Baltimore, Md. Dept. of Earth and Planetary Sciences; and Johns Hopkins Univ., Baltimore, Md. Dept. of Mechanics and Materials Science.
R. R. Long.

Tellus, Vol. 28, No. 5, p 460-472, 1976. 16 fig, 28 ref. ONR N00014-75-C-0805. Code N66019.

Descriptors: *Estuaries, *Mathematical studies, *Mixing, *Stratification, Inflows, Inlets(Waterways), Saline water, Brackish water, Analytical techniques, Mass transfer, Equations, Freshwater, Outlets, Depth, Theoretical analysis, Saline water intrusion.
Identifiers: *Halocline, *Baltic Sea, *British Columbia.

Fluxes of brackish and ocean water out of and into an estuary as well as the depth of the halocline in the estuary were discussed in this paper. The discussion ignored the details of the mass distribution and circulations in the main body of the estuary (except for the halocline depth) and concentrated on determining the flow conditions and interface depths in the vicinity of the mouth. The flow there was considered to be frictionless and the pressure hydrostatic. The first part of the analysis, which assumed strong mixing (and, therefore, a deep halocline) in the estuary, yielded the same results as those of Stommel and Farmer for their 'overmixed' state. Phenomena in this state were determined by a non-dimensional number, Q, proportional to the freshwater influx, q sub f. The problem can also be solved when the mixing is zero. The two extreme cases suggest a dependence on a mixing number, M, for arbitrary mixing. This permits a complete solution for the ocean water flux, brackish water flux, depth of the interface at the mouth, salinity of the brackish water, depth of the halocline in the man body of the estuary, and height above sea level of the free surface in the estuary, all as functions of q sub f and M. An interesting feature of all solutions is the main halocline depth which always becomes large for both weak and strong freshwater fluxes, and, therefore, has a minimum at a value q sub fm which varies with M. This behavior has been observed in Alberni Inlet in British Columbia and in a laboratory experiment by Welander. Comparison of theory with the Baltic Sea led to some numerical results and speculations. (See also W75-02384) (Humphreys-ISWS)
W77-03751

MEAN CIRCULATION IN SHALLOW SEAS,
Woods Hole Oceanographic Institution, Mass.
G. T. Csanady.
Journal of Geophysical Research, Vol. 81, No. 30, p 5389-5399, October 20, 1976. 3 fig, 3 tab, 15 ref.

Descriptors: *Model studies, *Ocean circulation, *Atlantic Ocean, Mathematical models, Circulation, Water circulation, Salinity, Salts, Winds, Tides, Rivers, Continental shelf, Stress, Physical properties, Boundary layers, Oceanography.
Identifiers: *Shallow seas, Salt transport.

The mean circulation of shallow seas arises as the residue of chaotic first-order flow episodes created by winds, tides, and river inflow. The average effect of many such episodes is to generate an internal pressure and shear stress distribution which may differ significantly from a steady solution of the equations of motion. Within the coastal boundary layer (of about 10-km width), complex average effects of variable flow probably dominate. However, research reported in this paper has shown that in mid-shelf regions of the Mid-Atlantic Bight, for example, classical steady state models adequately describe the main features of the mean circulation. The statistical effects of variable first-order flow even bring about some simplifications of the theory, i.e., linear internal and bottom friction laws and a decoupling of salt transport from the mean circulation. The mid-shelf circulation of the Mid-Atlantic Bight was thus found to consist of four additive components, each driven by offshore wind, longshore pressure gradient, and density contrasts caused by freshwater influx. The longshore pressure gradient enters the theory as a parameter necessary for describing the interaction of a portion of the continental shelf with the rest of the ocean. The pressure gradient driven flow component is responsible for some notable circulation features such as the line of divergence in bottom drift at about the 60-m isobath. The wind-driven and thermohaline flow components are familiar in character. Quantitatively, the four components together account satisfactorily for the observed mean shelf circulation. (Sims-ISWS)
W77-03753

NEARSHORE CURRENTS OFF LONG ISLAND,
Brookhaven National Lab., Upton, N. Y.
J. T. Scott, and G. T. Csanady.
Journal of Geophysical Research, Vol. 81, No. 30, p 5401-5409, October 20, 1976. 9 fig, 2 tab, 13 ref.

Descriptors: *Ocean currents, *Boundary layers, *Atlantic Ocean, Currents(Water), Tides, Winds, Temperature, Water temperature, Salinity, Density, On-site investigations, Coasts, Shores, Circulation, Water circulation, Oceans, Oceanography, *New York.
Identifiers: *Long Island(NY).

Currents were observed at three levels, using electromagnetic current meters, for a 25-day period in September 1975 at 11 km south of Long Island where the water is 32 m deep. Tidal currents were found to be moderately strong, of the order of 20 cm/s. Nontidal flow is caused by wind stress, horizontal density contrasts due to freshwater influx, and a longshore surface level gradient sloping down southwestward. The time-averaged flow has simple characteristics which are adequately described by classical Ekman models in frictional equilibrium. By suitable changes in the averaging period, quantitative estimates of a bottom friction coefficient and a longshore pressure gradient were deduced from the data. The bottom friction coefficient agrees with what one would estimate from boundary layer theory for roughness elements of about 70-cm height. The longshore pressure gradient deduced from the behavior of currents agrees with the evidence of geodetic leveling. (Sims-ISWS)
W77-03754

AN HISTORICAL SKETCH OF PHYSICAL OCEANOGRAPHY IN CANADA,
Fisheries and Marine Service, Ottawa (Ontario).
N. J. Campbell.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 10, p 2155-2167, October 1976. 36 ref.

Descriptors: *History, *Oceanography, *Canada, Surveys, Organizations, Universities, Ships, Scientific personnel, Research facilities, Fisheries, Marine biology, Sea ice, Oceans, Limnology.
Identifiers: *Physical oceanography.

The history of Canadian oceanography was outlined through the contributions of individual scientists and the organizations or programs they were associated with from 1890 to the early 1970's. The period up to 1960 reflects not only the scientific and personal efforts of H. B. Hachey, J. P. Tully, W. M. Cameron, and G. L. Pickard, but also their work in establishing oceanography as a science in Canada. The organizational developments which took place in the 1960's and their culmination in the building of the Bedford Institute of Oceanography, the Canada Centre for Inland Waters, and the Institute of Ocean Sciences now under construction on the west coast were described. (Sims-ISWS)
W77-03759

EVIDENCE OF A WESTWARD-FLOWING 'SUBARCTIC COUNTERCURRENT' IN THE NORTH PACIFIC OCEAN,
Department of the Environment, Victoria (British Columbia). Inst. of Ocean Sciences.
S. Tabata.
Journal of the Fisheries Research Board Canada, Vol. 33, No. 10, p 2168-2196, Oct 1976. 18 fig, 1 tab, 42 ref.

Descriptors: *Ocean circulation, *Pacific Oc *Subarctic, *Ocean currents, Monthly, Surfa *Currents(Water), Water transfer, Winds, On investigations, Ships, Oceanography.
Identifiers: North Pacific Ocean, Ekman tr port.

An examination of surface current velocity obtained from two independent ship sources gested the presence of a narrow, weak, westw flowing countercurrent at a latitude of appr mately 50 deg N in the subarctic Pacific reg Oceanographic survey data collected in the re from the summers of 1958 and 1959 also indi such a countercurrent extending zonally for n than 1000 km. The countercurrent can be plained by consideration of the wind-stress vor ty field over the region. (Sims-ISWS)
W77-03760

A RECONNAISSANCE OF THE RECENT SE MENTS OF THE RANNS OF KUTCH, INDIA
Imperial Coll. of Science and Technology, Lon (England). Dept. of Geology.
K. W. Glennie, and G. Evans.
Sedimentology, Vol 23, No 5, p 625-647, Oct 1976. 11 fig, 1 tab, 22 ref.

Descriptors: *Surveys, *Sediments, *Tidal fects, *On-site investigations, Mud flats, S pling, Cores, Core logging, Estuaries, Inter areas, Evaluation, Water analysis, Rivers, On data collections, Mineralogy, Foreign countrie
Identifiers: *India, *Kutch(India), Mineral an sis.

The Ranns of Kutch are flat, salt-covered de areas (sabkhas) which are just above the no tidal range and may be regarded as supratidal f They are flooded annually by the storm tide the Southwest Monsoon. As the waters recede evaporate, they leave behind a crust of halite, gypsum crystals grow within the clays and sa The increase in salinity of the interstitial wate they are traced inland is reflected in the hi boron content of the clays. The Mg(2+)/Ca (ratio of these waters increases from 3 on the c to 240 in the evaporite environment of shoreline of Pachham Island. Much of the s ment of the Ranns was probably once deri from the Indus and Nara rivers which used to f into the western end of the Great Rann. Cla now probably carried in by the monsoon st tides after being transported along shore from Indus and also from the rivers of Kutch Kathiawar. Coarser siliciclastic sediment is car into the eastern inland portion of the area by Luni and other intermittently flowing rivers streams. Some sand and silt is blown into Ranns from the surrounding hilly ar Foraminifera are found concentrated in the sa er fractions of the sediments, having been tr ported there primarily by tidal currents and also the wind. One species of Ammonia is almost only fauna found in the sediments of the v saline environment around Pachham Isl (Humphreys-ISWS)
W77-03762

SOME REMARKS ON THE MAINTENANCE THE SALINITY DISTRIBUTION IN EST RIES,
Liverpool Univ. (England). Dept. of App Mathematics and Theoretical Physics.
P. C. Chatwin.
Estuarine and Coastal Marine Science, Vol 4, 5, p 555-566, September 1976. 4 fig, 1 tab, 17 ref

Descriptors: *Salinity, *Estuaries, Mathemat studies, *Water circulation, *Model stud Physical properties, Circulation, Estuarine vironment, Gulfs, Mathematics, Mathemat

UNIV. OF ILL. URBANA-CHAMPAIGN

els, Saline water, Numerical analysis, Sea
r, Water quality, Equations, Salt balance,
ribution.
tifiers: *Salinity distribution, Model equa-
, *Estuarine circulation, *Salinity gradients,
nity variation, Model estuary, Vertical diffu-
, Longitudinal advection, Tidal period.

et of model equations describing the time-
aged velocity and salinity in an estuary was
ssed and used to obtain expressions for the
itudinal and vertical components of velocity
for the salinity distribution. The theory was
vn to be self-consistent in the central part of
stuary and to be in agreement with observa-
reported by Harleman and Ippen (1967).
lly, it was argued that theoretical treatments
is problem which use a steady one-dimen-
l diffusion equation to describe the longitu-
salinity distribution are physically un-
stic. (Henley-ISWS)
-03764

IERICAL MODELS FOR THE PREDIC-
N OF WAVE SET-UP AND NEARSHORE
CULATION,
ware Univ., Newark. Dept. of Civil Engineer-

. Birkemeier, and R. A. Dalrymple.
ilable from the National Technical Informa-
Service, Springfield, VA 22161 as AD-A022
Price codes: A07 in paper copy, A01 in
ofiche. Technical Report No. 1, January 1976.
p, 28 fig, 35 ref, 2 append. ONR N0014-76-C-
.

criptors: *Model studies, *Waves(Water),
ter circulation, Mathematical models, *Ocean
es, Beaches, Mathematical studies, Coasts,
ations, Shores, Circulation, Currents(Water),
e element analysis, Estuaries.
tifiers: Wave set-up, Rip currents,
arshore circulation.

explicit finite difference model for predicting
-dependent, wave-induced nearshore circula-
was discussed. The formulation included
e refraction, wave-current interaction, an
otropic bottom friction, wave set-up, wind ef-
, and coastal flooding. In addition to the ex-
t scheme, a one-dimensional implicit scheme
developed to determine the importance of the
vective acceleration terms in the equation of
on. Results were shown for the following
e cases: (1) set-up in a wave channel due to
dy waves and wave groups, (2) circulation in a
ngular wave tank under oblique wave attack,
(3) wave and wind induced circulation on a
shore periodic beach. In all three cases, com-
ion with experimental data was made. Impor-
results were as follows: tuned wave groups
incite seiching in an enclosed basin and har-
and rip currents will be induced or maintained
he presence of surf zone channels. (Sims-
S)
-03769

: CEPHALOPODA. PART I: OEGOPSIDA;
T II: MYOPSIDA, OCTOPODA,
hun.
ilable from the National Technical Informa-
Service, Springfield, VA 22161 as TT69-
7/1 and 2, Price codes: E10 in paper copy, A01
icrofiche. Verlag Von Gustav Fischer, Jena,
. Text, 436 p. 95 plates, 184 ref; Atlas, 264 p.
ates. Translation of Vol. 18, Scientific Results
ne German Deepsea Expedition on Board of
Steamship 'Valdivia', 1898-1899.

criptors: *Marine animals, *Mollusks,
ssification(Biological), Systematics, Varie-
Oceans, Speciation, Taxonomy.
tifiers: *Cephalopoda, *Oegopsida,
opsida, *Octopoda, *Squids, Octopuses.

The text of this two-part 18th volume presents the results of the German 1898-1899 deepsea expedition on board the SS 'Valdivia' conducted under the auspices of the German Ministry of the Interior. It was translated from the German by the Israel Program for Scientific Translations in 1975 and describes the anatomy of nine families of Oegopsida libera, one family of Oegopsida consuta, three families of Myopsida, and seven families of Octopoda, including larval, juvenile and adult stages. Details are given of external characteristics, such as head, funnel apparatus, mantle, arm apparatus, and hectocotylization of some species. The internal organization is defined by nervous systems, intestinal tracts, vascular systems, excretory systems, body cavity, genitalia, and luminous organs. The narration is supplemented by illustrations. A separately bound companion atlas consists of 95 plates, in color and black-and-white, of the morphology of the various species. (Auen-Wisconsin)
W77-03776

EFFECTS OF OIL ON THE AMPHIPOD GAMMARUS OCEANICUS,
Swedish Water and Air Pollution Research Lab., Nykoping. Baltic Sea Lab.
For primary bibliographic entry see Field 5C.
W77-03777

PRIMARY PRODUCTIVITY OF THE BENTHIC MICROALGAE IN THE CHURCHI SEA NEAR BARROW, ALASKA,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 5C.
W77-03782

ANALYSIS OF SIX BROADBAND OPTICAL FILTERS FOR MEASURING CHLOROPHYLL-A AND SUSPENDED SOLIDS IN THE PATUXENT RIVER,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 5A.
W77-03785

DISTRIBUTION OF LOW-MOLECULAR-WEIGHT HYDROCARBONS IN SOUTHERN BEAUFORT SEA,
Department of the Environment, Victoria (British Columbia). Ocean Chemistry Div.
For primary bibliographic entry see Field 5B.
W77-03793

EFFECTS OF PULP MILL EFFLUENT ON PHYTOPLANKTON PRODUCTION IN COASTAL MARINE WATERS OF BRITISH COLUMBIA,
Fisheries and Marine Service, West Vancouver (British Columbia). Pacific Environment Inst.
For primary bibliographic entry see Field 5C.
W77-03797

MARINE PHYTOPLANKTON GROWTH IN HIGH CONCENTRATIONS OF PULP MILL EFFLUENT,
Fisheries and Marine Service, West Vancouver (British Columbia). Pacific Environment Inst.
For primary bibliographic entry see Field 5C.
W77-03798

WATER QUALITY MONITORING: KANEOHE BAY AND SELECTED WATERSHEDS JULY TO DECEMBER 1975,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 5B.
W77-03826

A MATHEMATICAL MODEL FOR SIMULATING WATER QUALITY UNDER NON-STEADY STATE CONDITIONS,
North Carolina State Univ., Raleigh. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W77-03831

MEASUREMENTS OF A SMALL NEAR-BOTTOM CYCLONIC CIRCULATION NEAR THE GULF STREAM AXIS,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Atlantic Oceanographic Lab.
R. A. Clarke.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 10, p 2197-2202, October 1976. 7 fig, 4 ref.

Descriptors: *Ocean circulation, *Ocean currents, *Atlantic Ocean, Circulation, Water circulation, Currents(Water), Density, On-site investigations, Current meters, Bathymetry, Oceanography, Measurement.
Identifiers: *Gulf Stream, Cyclonic circulation.

Data from near-bottom current meters moored in a small triangular array (25 km/side), plus hydrographic sections, revealed the presence of a near-bottom cyclonic circulation with a radius of 50 km and velocity of 10 cm/s just north of the Gulf Stream near 50 W. The circulation extends to at least 1350 m from the ocean floor and was observed over a period of 9 days during which time it moved southward toward the Stream with speeds of 0.5-15 cm/s. The strength of the circulation decreases somewhat with distance from the bottom. (Sims-ISWS)
W77-03842

SPECTRAL ANALYSIS OF THE LONG-TERM OCEANOGRAPHIC TIME SERIES AT OCEAN WEATHER STATION 'P',
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Atlantic Oceanographic Lab.
C. K. Ross, and G. T. Needler.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 10, p 2203-2212, October 1976. 9 fig, 2 tab, 11 ref, 2 append.

Descriptors: *Time series analysis, *Water temperature, *Density, *Pacific Ocean, Analytical techniques, On-site investigations, On-site data collections, Data processing, Ships, Frequency analysis, Oceanography.
Identifiers: *Ocean weather stations, Ocean Station P, Weatherships, Spectral analysis, Spectral estimates, Missing data.

Oceanographic observations taken at Ocean Station 'P' (50 N, 145 W) provide one of the few long oceanographic time series. The intermittent nature of the sampling program at Station 'P', however, presents problems for a standard time-series analysis. In this paper, the seriousness of this aspect of the data was discussed, and spectral estimates were obtained for the potential temperature, potential density anomaly, and dynamic height anomaly at several depths. It was found that the lowest frequency estimates of dynamic height anomaly are approximately an order of magnitude less than those obtained from a similar station in the North Atlantic. This is consistent with a more rapid falloff of energy with depth at Station 'P'. (Sims-ISWS)
W77-03843

A STUDY IN THE SLOPE WATER REGION SOUTH OF HALIFAX,
Dalhousie Univ., Halifax (Nova Scotia). Dept. of Oceanography.
M. G. Gatien.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 10, p 2213-2217, October 1976. 6 fig, 1 tab, 6 ref.

Descriptors: *Water temperature, *Density, *Continental slope, *Atlantic Ocean, On-site investigations, Data processing, Temperature, Salinity, Currents(Water), Ocean currents, Circulation, Ocean circulation, Oceanography, Canada.
Identifiers: *Slope water, *Gulf Stream, *Labrador current.

Based on a reanalysis of the data from the Gulf Stream 1960 survey, it was proposed that the Slope Water is comprised of two distinct zones. The first, warm Slope Water, is a well-mixed zone found between 0 and 400 m depth close to the Gulf Stream; the flow is primarily eastward. The second zone, Labrador Slope Water, is deeper, clings to the continental slope below 100 m, and is broadest near sigma sub t = 27.5; it is poorly mixed and flows to the west. The boundary between the two zones varies in shape and intensity in response to changes in the Gulf Stream and the Labrador Current. Observations made in the Slope Water region south of Halifax in November 1973 were discussed in terms of the two Slope Water zones. In particular, movements of the boundary between the two zones were examined. (Sims-ISWS)
W77-03844

SUBSURFACE CURRENTS IN THE STRAIT OF GEORGIA, WEST OF STURGEON BANK,
British Columbia Univ., Vancouver. Inst. of Oceanography.
P. Chang, S. Pond, and S. Tabata.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 10, p 2218-2241, October 1976. 18 fig, 3 tab, 34 ref.

Descriptors: *Currents(Water), *Subsurface flow, *Estuaries, Tides, Tidal waters, Temperature, Water temperature, Frequency analysis, Time series analysis, Coasts, Circulation, Water circulation, On-site investigations, Canada.
Identifiers: *Strait of Georgia(Canada), *British Columbia, *Spectral analysis, Tidal currents.

Spectral characteristics of subsurface currents and temperature records spanning 310-533 days from the Strait of Georgia near Sturgeon Bank were examined. Of particular interest are low-frequency fluctuations having a characteristic period of 30 days. Typically, the energy of the low-frequency and tidal currents are equal at 50 m (each about 40% of the total) and 10 and 70%, respectively, at 200 m. Low-frequency currents are observed to be baroclinic and possess a lateral length scale less than 10 km. Their generation mechanisms are not identified. Low-frequency fluctuations in sea level and current have poor-to-fair coherence, while fluctuations in air pressure and current have poor coherence. Low-frequency fluctuations in wind and current have fair coherence at the eastern mooring and poor coherence at the remaining two moorings. Fluctuations in water temperature have a characteristic period of 300 days. Water temperatures at different locations generally have poor coherence except at the lowest frequencies where they are fair to good. Water temperature and current at the same location have poor coherence. Tidal currents are found to be ellipses, with the large constituents being M sub 2 and K sub 1. The magnitude, shape, and orientation of the tidal current ellipses ar time-dependent. Internal tides were suggested as an explanation. (Sims-ISWS)
W77-03845

TIDAL CURRENTS AND ESTUARINE-TYPE CIRCULATION IN JOHNSTONE STRAIT, BRITISH COLUMBIA,
Department of the Environment, Victoria (British Columbia). Inst. of Ocean Sciences.
R. E. Thomson.
Journal of the Fisheries Research Board of Canada, Vol 33, No 10, p 2242-2264, October 1976. 16 fig, 1 tab, 12 ref.

Descriptors: *Currents(Water), *Estuaries, *Tides, Tidal waters, Current meters, Frequency analysis, Salinity, Density, Temperature, Water temperature, Dissolved oxygen, Circulation, Water circulation, Winds, On-site investigations, Data processing, Analytical techniques, Canada.
Identifiers: *Johnstone Strait(Canada), *British Columbia, Tidal currents.

Four months of current meter observations across the western basin of Johnstone Strait have been examined, with particular attention given to the mean flow and to variations at tidal frequencies. It was shown that the time-averaged motions are typical of a moderately stratified estuary driven by tidal mixing and nonlinear advection. Steady currents are nearly unidirectional at all depths, with the net outflow in the upper layer essentially balanced by a net inflow in the lower layer to order 1000 cu m/s. In addition, the relatively small variation in residual current speed is found to decrease with depth and to be associated mostly with the quasi-fortnightly tidal cycle. Near the surface, the variance in the residual flow appears to be related to along-channel winds whose speeds and duration exceed 6 m/s and 24 h, respectively. Time-dependent motions are dominated by the tidal signal, which is mixed and predominately semidiurnal. Maximum speeds of order 1 m/s are found at depth and are generally 1.5-1.7 times larger than in the upper layer. There is also a strong correlation between the tidal current speeds below 150-m depth, and the local tide height lagged by 6 h. It was suggested that these larger lower layer currents are associated with baroclinic motions being generated by the barotropic tide propagating over the rapidly shoaling bathymetry to the east of the observation region. (Sims-ISWS)
W77-03846

MEASUREMENTS OF WAVES IN SOUTHAMPTON WATER AND THEIR VARIATION WITH THE VELOCITY OF THE TIDAL CURRENT,
University of East Anglia, Norwich (England). School of Environmental Sciences.
C. E. Vincent, and D. J. Smith.
Estuarine and Coastal Marine Science, Vol. 4, No. 6, p 641-652, November 1976. 5 fig, 12 ref.

Descriptors: *Waves(Water), *Estuaries, *On-site investigations, *Tidal waters, Currents(Water), Analytical techniques, Measurement, Evaluation, Mathematical models, Equations, Energy, Tides, On-site data collections, Numerical analysis.
Identifiers: *Southampton water(England).

Measurements of waves and currents at one location in Southampton Water showed considerable increase in the wave energy when the tide begins to ebb. Some of the theoretical changes in the form of wind-generated waves in estuaries can be described using non-time varying currents. With the addition of time variation, it was shown that numerical techniques offer a useful method for determining theoretically the changes in the wave energy and wave number of waves interacting with tidal currents. The trends in the variation of wave energy with current speed of the observed data and the numerical model were shown to be in broad agreement, but the considerable variability between consecutive spectra of the Southampton Water data require further explanation. It was suggested that the variability between the wave spectra is probably a result of the combination of the kinematic effects of trapping and focussing in the current shear, while the general trend of increasing wave energy with increasing counter current is a dynamic effect of wave-current interaction. (Humphreys-ISWS)
W77-03856

ACCUMULATION AND DISTRIBUTION OF TOTAL MERCURY IN ESTUARINE SEDIMENTS,
Bedford Inst. of Oceanography, Darmouth (Nova Scotia). Atlantic Geoscience Centre; and Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Environmental Marine Geology.
For primary bibliographic entry see Field 5B.
W77-03857

THE EFFECTS OF FRESHWATER INFLOW ON HYDROLOGICAL AND BIOLOGICAL PARAMETERS IN THE SAN ANTONIO BAY SYSTEM, TEXAS,
Texas Parks and Wildlife Dept., Austin. Coastal Fisheries Branch.
R. Childress, E. Bradley, E. Hagen, and S. Williamson.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-246 905. Price codes: A10 in paper copy, A01 in microfiche. Report on Project No. 2-160-R, August 1975. 20 p, 71 fig, 29 tab, 58 ref.

Descriptors: *Texas, *Bays, *Estuaries, *Freshwater, *Hydrologic data, *Meteorologic data, *Biological communities, Rainfall, Nutrients, Phosphorus, Nitrogen, Currents(Water), Fish, Shellfish.
Identifiers: *San Antonio Bay(Tex).

Semi-monthly samples of biologic, water quality and meteorologic parameters were taken at various stations in the San Antonio Bay system of Texas. Hydrographic parameters concerning current movements were measured at selected intervals. The biological data and historical commercial fish and shellfish landings statistics were subjected to computerized analysis for possible correlations with simple and cumulative lag river inflow to the estuary and various hydrologic parameters. These analyses were performed in an effort to determine the importance of freshwater inflows, their effect on estuarine biota, and the quantity and quality of fresh water required by the system. Based on information obtained from this project, riverflow appears to be the major source of fresh water and nutrients of the San Antonio Bay system. The ecology of the plants and animals which presently constitute the biologic community is controlled mainly by the interaction between the river inflow from the upper bay and saltwater intrusion from the lower portions of San Antonio Bay. Many of the fish and shellfish respond markedly to changes in the amount and timing of freshwater inflows. It can be inferred that any major deviation in the annual amount or timing of freshwater inflows from the historic average range will cause a major alteration in the ecology of the system. (Sinha-OEIS)
W77-03897

ESTABLISHMENT OF OPERATIONAL GUIDELINES FOR TEXAS COASTAL ZONE MANAGEMENT. SPECIAL REPORT I: WATER QUALITY MODELLING AND MANAGEMENT STUDIES FOR CORPUS CHRISTI BAY: A LARGE SYSTEM APPROACH,
Texas Univ., at Austin. Center for Research in Water Resources.
For primary bibliographic entry see Field 5B.
W77-03898

EFFECTS OF SUSPENDED AND DEPOSITED SEDIMENTS ON ESTUARINE ORGANISMS PHASE II,
Maryland Univ., Solomons. Natural Resource Inst.
For primary bibliographic entry see Field 5C.
W77-03901

COASTAL MARINE POLLUTION AND FISH,
Fisheries and Marine Service, West Vancouver (British Columbia). Pacific Environment Inst.
For primary bibliographic entry see Field 5C.
W77-03902

U. OF I. URBANA-CHAMPAIGN

TOGRAMMETRIC EXPERIMENTS ON SHORE MIXING AND DIFFUSION,
al Engineering Research Center, Fort ir, Va.
Teleki, and D. A. Prins.
able from the National Technical Informa- Service, Springfield, Va 22161 as AD-A014 Price codes: A02 in paper copy, A01 in fiche. U.S. Army Coastal Engineering rch Center Reprint No. R9-74. Reprint from roceedings of the Second International Con- ce on Port and Ocean Engineering under Arc- nditions, (1974). 15 p, 13 fig, 1 tab, 17 ref.

iptors: *California, *Coastal structures, ogrammetry, *Diffusion, *Mixing, *Baseline s, *Environmental effects, *Water rces, Circulation, Coastal engineering, tical techniques.
fiers: *Outer Continental Shelf, Coastal Nearshore environment, Marine environ- Offshore structures.

multispectral photography and fixed point ing were used in the study of coastal currents sites in California. The system combining t meters, low-altitude photography and densitometric analysis of the suspended r or tracer dyes is well suited to the study of advective and diffusive processes in the . Experiments were carried out in the vicini- marine structures for the purpose of un- nding their influence on coastal circulation. -OEIS)
03907

SUREMENT OF VOLATILE AND NON- ATILE HYDROCARBONS IN SELECTED AS OF THE ATLANTIC OCEAN,
n Research and Engineering Co., Linden, Analytical and Information Div.
rimary bibliographic entry see Field 5A.
03911

IC CONTRIBUTION TO THE SEASONAL LLATION OF SEA LEVEL OFF OREGON,
n State Univ., Corvallis. School of Oceanog- .
Brunson, and W. P. Elliott.
able from the National Technical Informa- Service, Springfield, VA 22161 as AD-A009 Price codes: A02 in paper copy, A01 in fiche. Reprint from Journal of Physical ography, Vol 4, No 3, p 304-309, July 1974. 5 ab, 9 ref.

iptors: *Oregon, *Sea level, *Upwelling, line studies, *Environmental effects, Water rces, Salinity, Temperature, Ocean currents, ter patterns, *Columbia River, Seasonal.
fiers: *Outer Continental Shelf, *Seasonal ions, *Isostatic variations, *Wind stress, al zone, Oceanographic conditions.

al, haline and total steric departures of sea were calculated in a zone up to 165 n mi off ort, Oregon. The thermal and haline com- ts were about equal in magnitudes and in , giving low steric sea levels nearshore and ea levels offshore in summer and the reverse n in winter. These results are produced by oceanographic conditions and reflect al changes in upwelling and the position of olumbia River plume. In the region close to the combined effects of steric and at- eric-pressure-caused departures do not account for the observed variations of sea Wind stress variations are likely to be the important cause but other factors may well bute. (Sinha-OEIS)
03912

GH GAS FROM THE ATLANTIC TAL PLAIN,
are Univ., Newark. Coll. of Marine Studies. Swain.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A010 236, Price codes: A02 in paper copy, A01 in microfiche. Technical Report No. 35, March 1975. 21 p, 11 fig, 5 tab, 1 ref. ONR-N00014-69-A0407.

Descriptors: *Delaware, *Methane, *Marsh plants, *Aquatic plants, Resource development, *Baseline studies, Environment, Tidal marshes, *Tidal effects, Mangrove swamps, Freshwater, Pollutant identification.
Identifiers: U.S. East Coast, Coastal zone, *Marsh gas, Turtle grass, *Atlantic coastal plains.

Flows of marsh gas were measured at upland, freshwater marsh, and tidal marsh localities in Delaware in 1971 and 1972, and at a few other localities along the Atlantic coast in the early part of 1973. The gases, mainly methane, were collected in gas-tight flasks, and were analyzed by gas chromatography and mass spectrometry. Other gases detected include principally carbon dioxide, ammonia, ethylene, and hydrogen sulfide. At the localities in Delaware the flows were consistently greater in freshwater and upstream parts of tidal marshes than in the more seaward parts of the marshes where effects of tidal flushing are greater. Increased flows following rainstorms and decreased flows during prolonged dry spells were typical. At scattered localities in North Carolina, Georgia and Florida the higher flows of marsh gas were found in freshwater marshes having moderately negative Eh values, whereas low gas flows wer obtained from coastal mangrove and turtle grass environments or from freshwater acidic marshes with weakly negative Eh values. Cultures of a variety of marsh plants and bacterial mud show marked variations in methane evolution according to the species of plant. (Sinha-OEIS)
W77-03913

EFFECTS OF WASTE WATER ON ESTUARINE ECOSYSTEMS,
Maryland Univ., Solomons. Chesapeake Biological Lab.
For primary bibliographic entry see Field 5C.
W77-03914

ALTERNATIONS OF FLOW CHARACTERISTICS WITHIN GEOTHERMAL AREAS BY TIDAL FORCES,
Colorado Univ., Boulder. Dept. of Mechanical Engineering.
J. S. Rinehart.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-247 190, Price codes: A02 in paper copy, A01 in microfiche. National Science Foundation (RANN) Report No. NSF-FA-N-75-127, June 1975. 15 p, 5 ref. AER74-03429.

Descriptors: *Geothermal studies, *Tidal effects, *Flow characteristics, *Groundwater, *Heated water, *Pore pressure, Water resources, Earth pressure, Heat flow.

The state of strain within the earth is undergoing constant temporal and spatial changes that modify permeabilities and pore pressures, the regulators of the flow of fluids through rock masses. Any change in the state of strain can be expected to influence flow. Some important sources of the stresses producing strains are tidal forces, thermal forces, alterations in mechanical structure, and chemical reactions. Effects of tidal forces are the easiest to analyze since they can be calculated precisely. It is shown in this paper how tidal forces will alter the flow characteristics of certain plausible models of geothermal systems. Although tidal stresses are only of the order of ten to the minus seven power to ten to the minus eight power, the longer period tides especially could produce large and significant dimensional changes in the separation of fracture surfaces and the size of flow channels, and could influence appreciably the distribution of pore pressure. (Sinha-OEIS)
W77-03915

AN ENVIRONMENTAL SURVEY OF EFFECTS OF DREDGING AND SPOIL DISPOSAL, NEW LONDON, CONNECTICUT. 1ST QUARTERLY REPORT.
National Marine Fisheries Service, Highlands, N.J. Middle Atlantic Coastal Fisheries Center.
For primary bibliographic entry see Field 5C.
W77-03917

AN ENVIRONMENTAL SURVEY OF EFFECTS OF DREDGING AND SPOIL DISPOSAL, NEW LONDON, CONNECTICUT. 2ND QUARTERLY REPORT.
National Marine Fisheries Service, Highlands, N.J. Middle Atlantic Coastal Fisheries Center.
For primary bibliographic entry see Field 5C.
W77-03918

AN ENVIRONMENTAL SURVEY OF EFFECTS OF DREDGING AND SPOIL DISPOSAL, NEW LONDON, CONNECTICUT. 3RD QUARTERLY REPORT.
National Marine Fisheries Service, Highlands, N.J. Middle Atlantic Coastal Fisheries Center.
For primary bibliographic entry see Field 5C.
W77-03919

APPLICATIONS OF ERTS IMAGERY AND SHIPBOARD OBSERVATIONS TO COASTAL ENVIRONMENTS STUDIES. PART I - HYPERSALINE ENVIRONMENTS, PART II - COASTAL CIRCULATION ANALYSIS,
University of Southern California, Los Angeles. Dept. of Geological Sciences.
D. S. Gorsline, S. P. Vonder Haar, and C. C. Davis.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A014 570, Price codes: A03 in paper copy, A01 in microfiche. Final Technical Report No. USC-GEOL. - 76-1, August 1975. 40 p, 10 fig, 1 tab, 30 ref. ONR-N00014-67-A-0269-0009C.

Descriptors: *California, *Estuarine environment, *Circulation, *Salinity, *Flooding, *Sediment transport, *Baseline studies, *Environmental effects, Water resources, Evaporation, Humidity, Turbidity, Coasts, Satellites(Artificial), *Remote sensing.
Identifiers: Outer Continental Shelf, *Hypersaline environments, *Nearshore environments, *Coastal processes, ERTS imagery, LANDSAT imagery, Coastal zone.

Studies of the frequency of flooding and the duration of flooding effects on hypersaline coastal tidal and supra-tidal surface along the Baja California coast are reported. Studies show that the flooding is not necessarily seasonal but can have a period of over a year. Coincidence of onshore winds, spring tides and coastal topography are probably the main factors influencing the times of major flooding. Subsequent evaporation is at varying rates that reflect wuch factors as cloud cover and probably local changes in humidity and brine salinity. Dry surfaces are easily traversed by wheeled vehicles but even moderate wetting creates poor conditions of trafficability. Analysis of ERTS (LANDSAT) imagery off southern California is continuing. Preliminary examples of relationships between satellite imagery patterns and field observations from ships show a good regional correlation but details of the turbidity patterns are not as easily resolved from ship data due to the problem of travel time and station frequency. Ship data does serve to confirm satellite sensor data where stations and features coincide. (Sinha-OEIS)
W77-03921

PORT COLLECTION AND SEPARATION FACILITIES FOR OILY WASTES. VOL VI. IMPACT OF OFFSHORE TERMINALS ON CONTIGUOUS PORTS,
Harris (Frederic R.), Inc., New York.

For primary bibliographic entry see Field 5G.
W77-03923

PROCEEDINGS FOR SECOND ANNUAL CONFERENCE ON THE RESTORATION OF COASTAL VEGETATION IN FLORIDA.
Hillsborough Community Coll., Tampa, Fla.
For primary bibliographic entry see Field 5G.
W77-03942

KEYNOTE SPEECH, SECOND ANNUAL CONFERENCE ON RESTORATION OF COASTAL VEGETATION IN FLORIDA,
Environmental Protection Agency, Atlanta, Ga.
For primary bibliographic entry see Field 5G.
W77-03943

REVEGETATION OF THALASSIA TESTUDINUM IN A MULTIPLE-STRESSED ESTUARY, NORTH BISCAYNE BAY, FLORIDA,
Miami Univ., Fla. Dept. of Microbiology.
For primary bibliographic entry see Field 5G.
W77-03944

SEAGRASS REVEGETATION ATTEMPTS IN ESCAMBIA BAY, FLORIDA, DURING 1974,
Environmental Protection Agency, Sabine Island, Fla. Escambia Bay Recovery Study.
For primary bibliographic entry see Field 5G.
W77-03945

LOSS OF SUBMERGED VEGETATION IN THE PENSACOLA BAY SYSTEM,
Environmental Protection Agency, Sabine Island, Fla. Escambia Bay Recovery Study.
For primary bibliographic entry see Field 5G.
W77-03946

PATTERNS OF SECONDARY SUCCESSION IN A MANGROVE COMMUNITY, TAMPA BAY, FLORIDA,
East Stroudsburg State Coll., Pa. Dept. of Biology.
For primary bibliographic entry see Field 5G.
W77-03947

THE POSSIBLE ROLE OF SPARTINA ALTERNIFLORA LOISEL IN ESTABLISHMENT OF MANGROVES IN FLORIDA,
Hillsborough Community Coll., Tampa, Fla. Dept. of Biology.
For primary bibliographic entry see Field 5G.
W77-03948

EFFORTS IN MARINE REVEGETATION IN ARTIFICIAL HABITATS,
Marco Applied Marine Ecology Station, Marco Island, Fla.
For primary bibliographic entry see Field 5G.
W77-03949

ASPECTS OF RED MANGROVE REFORESTATION IN FLORIDA,
Florida Inst. of Tech., Jensen Beach. Environmental Studies.
For primary bibliographic entry see Field 5G.
W77-03950

PLANTINGS OF RED MANGROVE (RHIZOPHORA MANGLE L.) IN CHARLOTTE AND ST. LUCIE COUNTIES, FLORIDA,
Miami Univ., Coral Gables. Dept. of Biology.
For primary bibliographic entry see Field 5G.
W77-03952

LIGHTNESS AND COLOR OF THE SEA WATER IN THE TAGONOURA-PORT, (IN JAPANESE),
Tokai Univ., Shizouka (Japan). Faculty of Marine Science and Technology.
For primary bibliographic entry see Field 5A.
W77-03965

RUNOFF REGULATION FOR HYDRO-POWER AND ITS EFFECT ON THE OCEAN ENVIRONMENT,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia).
For primary bibliographic entry see Field 2E.
W77-03974

CONTROL OF FJORDIC DEEP WATER RENEWAL BY RUNOFF MODIFICATION,
Dunstaffnage Marine Research Lab., Oban (Scotland).
A. Edwards, and D. J. Edelsten.
Hydrological Sciences Bulletin, Vol 21, No 3, p 445-450, September 1976. 2 fig, 5 ref.

Descriptors: *Fjords, Control, *Model studies, Brackish water, Frequency, Rivers, Estuaries, Runoff, Control structures, Precipitation(Atmospheric), Deep water.
Identifiers: *Scotland, *Loch Etive(Scotland), Runoff records, Freshwater runoff, Renewal, Natural runoff pattern, Runoff modification, Fjordic deep water.

Loch Etive is a Scottish fjord subject to freshwater runoff which renders it markedly brackish. This paper considered the frequency of deep water renewal by developing a model which relates the timing of all such renewals to runoff records. Using the model, it is possible to examine the effect of changes caused by interference with the natural runoff pattern. The estuary-river system is very sensitive to changes in runoff pattern, but the magnitude and timing of man's interference has so far been sufficient only to increase the mean time between renewals by an insignificant amount. (Roberts-ISWS)
W77-03975

WIND AND THE SURFACE CIRCULATION OF A FJORD,
British Columbia Univ., Vancouver. Inst. of Oceanography.
J. R. Buckley, and S. Pond.
Journal of the Fisheries Research Board of Canada, Vol 33, No 10, p 2265-2271, October 1976. 7 fig, 1 tab, 9 ref.

Descriptors: *Circulation, *Water circulation, *Fjords, *Canada, Buoys, Radar, Velocity, Winds, Rivers, Salinity, Tidal effects, Tidal waters, Tides, On-site investigations, Data processing.
Identifiers: *Howe Sound(British Columbia), *British Columbia.

An experiment was carried out recently to investigate the relative effects of wind, tide, and river runoff on the circulation of the surface layer of a small fjord. Drogues were tracked with a radar set for several days at four locations. Data were recorded photographically and digitized for computer processing to produce the velocity and acceleration of each drogue along its track. Wind forcing was dominant. The river input was important too, causing large horizontal shears in the flow. Tidal effects appeared to be negligible. Frictional coupling between the surface layer and the water below appeared to be very small. A mechanism for the surface layer behavior was proposed, with the layer nearly decoupled from the underlying water by a strong pycnocline. The basic assumptions of this mechanism applied to the data set yielded an average drag coefficient of 1 to 0.002. (Sims-ISWS)
W77-03976

A CANADIAN ARCTIC FJORD WITH SOM COMPARISONS TO FJORDS OF TH WESTERN AMERICAS,
Department of the Environment, Victoria (Brit Columbia). Frozen Sea Research Group, and D partment of the Environment, Victoria (Brit Columbia). Ocean and Aquatic Affairs.
R. A. Lake, and E. R. Walker.
Journal of the Fisheries Research Board Canada, Vol 33, No 10, p 2272-2285, October 19 12 fig, 3 tab, 41 ref.

Descriptors: *Fjords, *Canada, *Arctic, Circu tion, Water circulation, Ice, Sea ice, Glacie Rivers, Temperature, Salinity, Density, Physi properties, Meteorology, Wi Discharge(Water), Tides, Tidal waters, Dissolv oxygen, Waves(Water), Internal waves, Estuari Oceanography.
Identifiers: *d'Iberville Fiord(Canada).

Aspects of oceanography of d'Iberville Fiord deg 30 min N, 80 deg 00 min W) were compared oceanography of west coast fjords of North South America. Because of high latitude, he cold temperature, d'Iberville Fiord is covered sea ice for at least 11 mo of each year. estuarine circulation flows under sea icec exc for those Augusts in which sea ice clears. The ice cover and the small tides typical of northwest Canadian arctic archipelago mean en gy inputs to fjord waters are small, and curre are light. However, water structure in ma respects is not dissimilar to that in fjords sewhere. Effects of a large active gla debouching into headwaters of d'Iberville Fi were noted. (Sims-ISWS)
W77-03977

WATER, HEAT, AND SALT TRANSPOR THROUGH NARES STRAIT, ELLESME ISLAND,
Defence Research Establishment Ott (Ontario).
H. E. Sadler.
Journal of the Fisheries Research Board Canada, Vol 33, No 10, p 2286-2295, October 19 7 fig, 2 tab, 29 ref.

Descriptors: *Water transfer, *Heat transf *Salts, *Arctic, *Canada, *Polar regions, Circu tion, Water circulation, Oceans, Ocean circu tion, Currents(Water), Mass transfer, Ice, Sea i Temperature, Salinity, Current meters, Ocean raphy.
Identifiers: *Nares Strait(Canada), *Ellesm Island(Canada).

Data obtained in Nares Strait were used to prov estimates of the transports of water, heat, and between the polar ocean and northern Baffin B The annual volume export of water through Na Strait is 21,000 cu km plus or minus 30%, whic equivalent to a mean flow of 0.67 times 10 to 6th power cu m/s and which is about 15% of total outflow of water from the polar ocean. T annual net heat input into the polar ocean due the outflow of cold water and ice was found to 15 times 10 to the 19th power J plus or minus 50 assuming a reference temperature of -0.1C. T volume is about 7% of the total advective h transport into the polar ocean. The mean ann export of salt from the polar ocean is 6.7 times to the 14th power kg plus or minus 30%, or ab 6% of the total export. The total transpo through the whole Canadian archipelago were e mated, and it was shown that they are apprecia fractions of the total exchanges between the po ocean and the world ocean. (Sims-ISWS)
W77-03978

SPECTRUM OF SMALL-SCALE OCEAN TEMPERATURE GRADIENTS,
Bedford Inst. of Oceanography, Dartmouth (No Scotia). Atlantic Oceanographic Lab.
J. A. Elliott, and N. S. Oakey.

al of the Fisheries Research Board of da, Vol 33, No 10, p 2296-2306, October 1976. 2 tab, 15 ref.

riptors: *Oceans, *Temperature, *Atlantic n, Time series analysis, On-site data collec-, Instrumentation, Model studies, Data essing, Water temperature, Salinity, Ther-ine, Analytical techniques, Oceanography. ifiers: *Microstructure spectra.

spectrum of the vertical temperature gradient computed for a number of 'typical' 50-m long les from the upper 200 m of the ocean. Most e variance occurs in the microstructure range, een approximately 1 and 100 cycles/m; there rmally a spectral maximum near 10 cycles/m. hape of the spectra for the range 10-100 cy-n agrees well with that predicted for sharp in-ces that have been smoothed by thermal dif-n. (Sims-ISWS)
03979

ETHOD FOR THE AUTOMATIC MEA-EMENT OF WAVE FREQUENCY,
da Centre for Inland Waters, Burlington rio).
onelan.
al of the Fisheries Research Board of da, Vol. 33, No. 10, p 2318-2322, October 3 fig, 11 ref.

riptors: *Waves(Water), *Measurement, ds, Model studies, Instrumentation, Automa-Frequency, Frequency analysis, Oceans, n waves, Oceanography. ifiers: *Automatic measurement.

dea was advanced that the dominant wave ency in a locally wind-generated sea may be ately estimated from the ratio of root-mean-e surface vertical velocity to root-mean-e surface deviation. Field and laboratory were used to establish the relationship en this ratio and the frequency of the peak of ectrum as a function of inverse wave age. age and the nondimensional fetch parameter shown to be uniquely related in the fetch-d case. Finally, a procedure was given for ating the appropriate one-dimensional spec-from automatic field measurements of ge wind speed, root-mean-square surface tion, and root-mean-square surface vertical ty. (Sims-ISWS)
03981

TRA AND COHERENCE OF WIND-RATED INTERNAL WAVES,
h Columbia Univ., Vancouver. Inst. of ography.
Kase, and C. L. Tang.
al of the Fisheries Research Board of da, Vol. 33, No. 10, p 2323-2328, October 5 fig, 15 ref.

iptors: *Internal waves, *Winds, *Model s, Mathematical models, Mathematical stu-Stress, Turbulence, Friction, Energy, nics, Ocean waves, Oceans, Oceanography.

e basis of a model for an internal wave field generated by a randomly varying isotropic tress and in which energy is transferred to scale turbulence, the two-dimensional ener-nsity function was derived. The coherence were determined by the highest order inter-ve mode that is not affected by virtual fric-the main thermocline, provided the curl of nd stress has a white noise wave number um. In general, this mode number scale is in-g monotonically with frequency. As a result h a frequency dependent mode bandwidth, ertical coherence drops with increasing ncy. (Sims-ISWS)
3982

STRAIT OF GEORGIA OSCILLATIONS: LOW-FREQUENCY CURRENTS AND TOPOGRAPHIC PLANETARY WAVES,
British Columbia Univ., Vancouver. Inst. of Oceanography.
J. A. Helbig, and L. A. Mysak.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 10, p 2329-2339, October 1976. 12 fig, 2 tab, 11 ref.

Descriptors: *Currents(Water), *Water circulation, *Straits, *Canada, Waves(Water), On-site investigations, Current meters, Model studies, Mathematical models, Energy, Topography, Estuaries, Oceanography.
Identifiers: *Strait of Georgia(Canada), *Water oscillations.

Chang recently showed that up to 46% of the horizontal kinetic energy in the Strait of Georgia, British Columbia, is contained in current oscillations possessing periods exceeding 4 days. In an attempt to explain these findings, a class of low-frequency oscillations in a model channel of the Strait of Georgia was studied. The Strait was modeled by an infinitely long, rectangular channel with a bottom that slopes upward to the east; the stratification was idealized by a two-layer system. The model admits northward-traveling, topographic planetary waves with frequencies that lie in the observed range for reasonable values of the wavelength. However, the model does not accurately predict the observed vertical distribution of the horizontal kinetic energy. (Sims-ISWS)
W77-03983

NUMERICAL MODEL STUDIES OF THE TIDES BETWEEN VANCOUVER ISLAND AND THE MAINLAND COAST,
Department of the Environment, Victoria (British Columbia). Ocean and Aquatic Affairs.
P. B. Crean.

Descriptors: *Straits, *Model studies, *Canada, Mathematical models, On-site investigations, Water levels, Tides, Tidal water, Currents(Water), Velocity, Coasts, Estuaries, Bays, Physical properties, Oceanography.
Identifiers: *Strait of Georgia(Canada), *Juan de Fuca Strait(Canada).

An extensive program of numerical model trials--employing joined one- and two-dimensional schemes--and observations have led to the successful simulation of barotropic tidal propagation in the complex system of channels and inlets between Vancouver Island and the mainland coasts. This paper presented some results obtained in the numerical simulation of a 7-day sequence of a 61-constituent mixed tide. An extensive program of field observations was carried out by the Canadian Hydrographic Service (Pacific Region) in connection with this work. The program included the simultaneous recording of water levels for at least 1 yr at 30 locations. Current data were obtained from arrays of meters moored over cross sections of the major conveying channels. Record lengths were generally about 30 days, though, in some instances, records over a year in length were obtained. The elevations computed by the model and those predicted on the basis of observations for two locations were compared. The agreement was good. The major components of velocity computed by the model agreed well with those predicted on the basis of observations. (Sims-ISWS)
W77-03984

NUMERICAL MODELING OF TIDES IN HUDSON BAY,
Department of the Environment, Victoria (British Columbia). Ocean and Aquatic Affairs; and Canada Centre for Inland Waters, Burlington (Ontario).
N. G. Freeman, and T. S. Murty.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 10, p 2345-2361, October 1976. 15 fig, 3 tab, 15 ref.

Descriptors: *Model studies, *Tides, *Bays, *Canada, Mathematical models, Water levels, Currents(Water), Water circulation, Mathematical studies, Mathematics, Oceanography.
Identifiers: *Hudson Bay(Canada), *James Bay(Canada), Water oscillations.

A two-dimensional numerical model was developed to study the co-oscillating and independent tides in Hudson Bay. Using centered differences (forward differences for the dissipative term) and conjugate Richardson lattices, the LaPlace Tidal Equations in spherical polar coordinates were integrated in time until cyclic equilibrium was reached. For the co-oscillating tide, the direct tidal forcing term was set to zero, and the observed tidal constituent was specified at the mouth of Hudson Bay. Separate runs were made for M sub 2, S sub 2, N sub 2, and K sub 1. For the independent tide, the closed mouth boundary condition of zero water transport was imposed, and the model run for the M sub 2 and K sub 1 directed tidal forcing. A number of experiments were carried out to test the sensitivity of the model to uncertainties in the input data and parameterization of some of the erms. It was shown that the tidal propagation is relatively insensitive to friction coefficient and island schematization, but it is very sensitive to depth representation in the Belcher Island area and phase variation in the specified boundary conditions. Overall, the model gives good qualitative agreement with shore-based data and can be used to interpret tidal propagation in the Hudson-James Bay system. (Sims-ISWS)
W77-03985

STORM SURGES IN THE SOUTHERN BEAUFORT SEA,
Department of the Environment, Victoria (British Columbia). Inst. of Ocean Sciences.
R. F. Henry, and N. S. Heaps.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 10, p 2362-2376, October 1976. 13 fig, 14 ref.

Descriptors: *Storm surge, *Arctic, *Canada, Winds, Model studies, Mathematical models, Sea level, Equations, Water levels, Mathematical studies, Water level recorders, Ice cover, Topography, Meteorology, Coasts, Oceans, Oceanography.
Identifiers: *Beaufort Sea.

Evidence of storm surge occurrence in the Canadian sector of the southern Beaufort Sea was reviewed, and distinctions were drawn between surges occurring in the absence and presence of ice cover. Two numerical models were described. One model was intended for detailed simulation of past surges, and the other, a compact, economical model, was designed for operational forecasting of surges. The associated system used to obtain the required wind-stress input to the numerical models was also discussed. (Sims-ISWS)
W77-03986

COMPUTER MODELING OF ERODIBLE FLOOD CHANNELS AND DELTAS,
San Diego State Univ., Calif. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W77-03993

AN APPROXIMATE SOLUTION FOR THE TRANSIENT INTERFACE IN A COASTAL AQUIFER,
Indian Inst. of Tech., Bombay.
For primary bibliographic entry see Field 2F.
W77-04001

ABYSSAL HYDROGRAPHY, NEPHELOMETRY, CURRENTS, AND

BENTHIC BOUNDARY LAYER STRUCTURE IN THE VEMA CHANNEL,
Woods Hole Oceanographic Institution, Mass.
D. A. Johnson, S. E. McDowell, L. G. Sullivan, and P. E. Biscaye.
Journal of Geophysical Research, Vol. 81, No. 33, p 5771-5786, November 20, 1976. 21 fig, 6 tab, 39 ref. NSF DES74-01744, ONR. N00014-74-C0262.

Descriptors: *Hydrography, *Oceanography, *Atlantic Ocean, *Hypolimnion, On-site investigations, Water temperature, Salinity, Instrumentation, Measurements, Currents(Water), Circulation, Ocean circulation, Oceans, Data collections, Submarine canyons, Thermocline, Turbidity, Boundary layers, Bathymetry, Deep water, Ocean currents, Topography.
Identifiers: *Vema Channel, Nepheloid layer.

New data from closely spaced hydrocasts, thermocline profiles, vertical nephelometer profiles, and direct bottom current observations within the Vema Channel allow an interpretation of the flow regime and the structure of the benthic boundary layer. A sharp gradient in potential temperature, light scattering, concentration of suspended particulates, and excess radon is present in the transition zone between northward flowing antarctic bottom water (AABW) and the overlying north Atlantic deep water. This transition zone, however, exhibits pronounced east-west asymmetry across the channel axis. Near-bottom current velocities measured in both the main branch and the western branch of the channel exhibit a significant cross-contour component in the mean flow. The temperature and light scattering data are consistent with a model of an asymmetrical flow regime such that (1) strongest northward current velocities are adjacent to the western wall of the channel, (2) frictional effects due to the presence of the wall induce strong turbulence in the flow, (3) turbulent mixing within the AABW results in a 'blurring' of the benthic thermocline and slight elevation of near-bottom temperatures in the channel axis, and (4) upslope (eastward) advection in a bottom boundary Ekman layer results in a veering of the mean velocity vector and the transport of coldest bottom water to the eastern margin of the channel. Intervals of abrupt increase in bottom water turbidity within the channel axis show no obvious correlation with variations in current velocity observed simultaneously. Consequently, the time variability in the nepheloid layer may reflect varying rates of sediment entrainment upstream in the Argentine Basin rather than resuspension of sediment within the channel itself. (Humphreys-ISWS)
W77-04004

ON THE DESCRIPTION OF THE HYDROGRAPHIC STATE AND THE CIRCULATION IN THE BALTIC DEEP WATER,
Goteborg Univ. (Sweden). Oceanographic Inst.
G. Walin.
Hydrological Sciences Bulletin, Vol. 21, No 3 p 463-465, September 1976. 2 ref.

Descriptors: *Estuaries, *Circulation, *Theoretical analysis, *Mathematical studies, Ocean circulation, Oceans, Mixing, Salinity, Hydrography, Hydrologic aspects, Analytical techniques.
Identifiers: *Baltic Sea.

A theoretical framework for the description of an estuarine system was outlined, with particular reference to the Baltic. This description, in terms of continuous functions of salinity and time, may be considered as a logical improvement of existing 'box models', which are inherently incapable of making efficient use of hydrographic data. Relations were derived between deep water supply and internal mixing properties, as well as the equations controlling diffusion of substances in general. (Humphreys-ISWS)
W77-04006

APPLIED MATHEMATICAL MODELLING IN MARINE SCIENCE,
Liege Univ. (Belgium). Institut de Mathematique.
J. C. J. Nihoul.
Applied Mathematical Modelling Vol. 1, No. 1, p 3-8, June 1976. 4 fig, 13 ref.

Descriptors: *Mathematical models, *Coasts, Sea water, Tidal waters, Projects, Ecology, Equations, Systems analysis, Model studies.
Identifiers: *Marine science, North Sea, Belgian coasts.

The essential elements of a general interdisciplinary marine model are reviewed; state variables are identified, evolution equations are discussed and major parameters indicated. The methods of reducing the size of the model by aggregation in state space (reduction of scope) or averaging in physical space (reduction of support) are revised with particular emphasis on the associated parameterization of the nonlinear effects. Examples of application are given in illustration and comparison of the models' predictions with observations indicates the degree of accuracy and the limits of viability of present state marine modelling. Considered specifically are mechanical state variables--Boussinesq theory, chemical and ecological state variables--aggregation and translocation theory, and reduction of support--parameterization of the nonlinear terms. The example application is the Math Modelsea Project, the Belgian Government's extensive physical, chemical and ecological survey of the North Sea progressively concentrating on the Southern Bight and the Belgian coastal waters. (Bell-Cornell)
W77-04008

CONCENTRATION OF POLYVALENT METALS BY SEAWEEDS IN VOSTOK BAY, SEA OF JAPAN,
Akademiya Nauk SSSR, Vladivostok.
For primary bibliographic entry see Field 5C.
W77-04023

HIGH SEAS OIL POLLUTION: PARTICULATE PETROLEUM RESIDUES IN THE NORTH ATLANTIC,
Bedford Inst. of Oceanography, Darmouth (Nova Scotia).
For primary bibliographic entry see Field 5B.
W77-04025

ARSENIC CONCENTRATIONS IN SOME COEXISTING MARINE ORGANISMS FROM NEWFOUNDLAND AND LABRADOR,
Fisheries and Marine Service, St. John's (Newfoundland). Biological Station.
For primary bibliographic entry see Field 5C.
W77-04036

FIN EROSION DISEASE OF STARRY FLOUNDER (PLATICHTHYS STELLATUS) AND ENGLISH SOLE (PAROPHRYS VETULUS) IN THE ESTUARY OF THE DUWAMISH RIVER, SEATTLE, WASHINGTON,
California Univ., Davis. Dept. of Pathology.
For primary bibliographic entry see Field 5C.
W77-04038

RELATIONSHIPS OF EPIBIOTIC FOULING AND MORTALITIES OF EGGS OF THE DUNGENESS CRAB (CANCER MAGISTER),
California Univ., Bodega Bay. Bodega Marine Lab.
For primary bibliographic entry see Field 5C.
W77-04040

THE CONDITIONS FOR BIODEGRADATION OF PETROLEUM HYDROCARBONS AT SEA,
Aix-Marseille-3 Univ. (France). Laboratoire de Microbiologie.
For primary bibliographic entry see Field 5B.
W77-04042

LONG-TERM CHEMICAL EFFECTS PETROLEUM IN SOUTH LOUISIANA WI LANDS - 1. ORGANIC CARBON IN SE MENTS AND WATERS,
Louisiana State Univ., Baton Rouge. Coastal S dies Inst.
For primary bibliographic entry see Field 5C.
W77-04043

ACCUMULATION AND RELEASE PETROLEUM-DERIVED AROMA HYDROCARBONS BY FOUR SPECIES MARINE ANIMALS,
Texas A and M Univ. College Station. Dept Biology.
For primary bibliographic entry see Field 5C.
W77-04045

DISTRIBUTION AND ABUNDANCE OF HEA METALS IN FINFISH, INVERTEBRATES A SEDIMENTS COLLECTED AT A DEEP WAT DISPOSAL SITE,
National Marine Fisheries Service, Highla N.J. Sandy Hook Lab.; and National Ma Fisheries Service, Highlands, N.J. Middle Atla Coastal Fisheries Center.
For primary bibliographic entry see Field 5B.
W77-04046

EFFECT OF HEAVY METALS ON HATCH OF BRINE SHRIMP EGGS,
Royal Univ. of Malta, Valletta. Dept. of Biolog
For primary bibliographic entry see Field 5C.
W77-04047

THE EFFECT OF CHINA CLAY ON THE F OF ST. AUSTELL AND MEVAGISSEY BAYS
Ministry of Agriculture, Fisheries and Fo Burnham-on-Crouch (England). Fisheries Lab.
For primary bibliographic entry see Field 5C.
W77-04049

DELETERIOUS EFFECTS OF COREXIT ON FERTILIZATION AND DEVELOPMENT,
Tromsoe Univ. (Norway). Inst. of Biology Geology.
For primary bibliographic entry see Field 5C.
W77-04050

THE DISTRIBUTION OF SHORT-CH HALOGENATED ALIPHATIC HYDROC BONS IN SOME MARINE ORGANISMS,
Liverpool Univ. (England). Dept. of Ocea raphy.
For primary bibliographic entry see Field 5C.
W77-04051

MOLECULAR TEST FOR OIL POLLUTION SURFACE SEDIMENTS,
Strasbourg Univ. (France). Institut de Chimie.
For primary bibliographic entry see Field 5B.
W77-04058

DISTRIBUTION OF HEAVY METALS IN SUES OF THE COMMON SEAL,
Liverpool Univ. (England). Dept. of Botany.
For primary bibliographic entry see Field 5C.
W77-04059

MERCURY IN TISSUES OF MUSSEL SOUTHERN CALIFORNIA,
Southern California Coastal Water Research ject, El Segundo, Calif.
For primary bibliographic entry see Field 5C.
W77-04060

U. of I. URBANA-CHAMPAIGN

ASSESSMENT OF THE POLLUTION OF NISH COASTAL WATERS,
s Research and Development, Epson and).
rimary bibliographic entry see Field 5B.
04061

E EFFECTS OF PETROLEUM ON ARINE AND MARINE MICRO-ORGAN-
land Univ., College Park. Dept. of biology.
rimary bibliographic entry see Field 5C.
04063

OMICTIC MECHANISMS IN A COASTAL E, (IN FINNISH),
Akademi, Turku (Finland). Inst. of Biology.
rimary bibliographic entry see Field 5C.
04071

A ON SEASONAL VARIATIONS IN IKTON AND ON THE HYDROLOGIC RACTERISTICS OF THE NORTH SEA, OSTENDE AND NIEUWPOORT: PERIOD M 1969 TO 1971, (IN FRENCH),
els Univ. (Belgium). Lab. of Comparative my.
rimary bibliographic entry see Field 5C.
04072

E OF THE MINERAL NUTRIENTS CON-UTED BY THE RIVER RHONE (FRANCE) THE ORGANIC PRODUCTION OF THE ERS OF THE GULF OF LIONS, (IN ICH),
rimary bibliographic entry see Field 5C.
04073

UDY ON THE INFLUENCE OF SALINITY CTUATIONS UPON THE BACTERIAL RA OF THE LAGOON CIENAGA GRADE ANTE MARTA (COLOMBIA) AND THE CENT COASTAL REGION, (IN GER-
), Univ. (West Germany). Institut fuer eskunde.
rimary bibliographic entry see Field 5B.
04076

ER POLLUTION OF THE RIVERS FLOW-EASTWARDS INTO THE BAY OF ISE, (IN NESE),
rimary bibliographic entry see Field 5B.
04080

TERIOLOGICAL CHARACTERISTICS OF COAST WATERS IN THE DISTRICT OF NIA (ITALY), (IN ITALIAN),
ia Univ. (Italy).
rimary bibliographic entry see Field 5G.
04084

ATIONS IN CD, PB AND CU CONTENT VATERS OF THE LOWER ESTUARY OF SAINT LAWRENCE DURING THE MER OF 1972, (IN FRENCH),
ec Univ., Rimouski. Dept. of Oceanography; Quebec Univ., Rimouski. Dept. of Pure ces.
rimary bibliographic entry see Field 5A.
04086

HE FAUNA OF A FRESHWATER FLAT IN ELBE ESTUARY (GERMANY), (IN GER-
urg Univ. (West Germany). Museum of gy.
imary bibliographic entry see Field 5C.
04087

COMPARATIVE INVESTIGATIONS ON THE SELF-PURIFICATION IN POLLUTED WATERS OF DIFFERENT SALINITIES, (IN GERMAN),
Kiel Univ. (West Germany). Institut fuer Meereskunde.
For primary bibliographic entry see Field 5G.
W77-04098

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

INHIBITION OF SCALE ON SALINE WATER HEAT EXCHANGE SURFACES WITH IMINODIACETIC ACID COMPOUNDS,
Grace (W. R.) and Co., Cambridge, Mass. (Assignee).
J. Block, and N. S. Marans.
U.S. Patent No. 3,981,779, 4 p, 4 ref; Official Gazette of the United States Patent Office, Vol 950, No 3, p 1126, September 21, 1976.

Descriptors: *Patents, *Water treatment, *Water purification, *Desalination, Evaporation, Distillation, *Scaling, *Chelation, Saline water, Surfactants, Desalination equipment, Evaporators.
Identifiers: *Chelant-surfactants.

Sea water contains a substantial amount of components which deposit onto metal containing and alloy containing surfaces as scale and related hydrophilic foulants. The alkaline scales, including calcium carbonate and magnesium hydroxide, are particularly troublesome in sea water evaporators. Chelant-surfactants having hydrophobic and chelating moieties may be used to decrease fouling. When used in accordance with this invention, such chelant-surfactants are believed to chelate with the metal or alloy-containing surfaces through chelating moieties and provide a hydrophobic barrier which aids in decreasing deposition of scale and similar hydrophilic deposits. Chelant-surfactants effective in the present invention include N-lauryliminodiacetic acid, N-oleyliminodiacetic acid, N-oleoyliminodiacetic acid, alkali metal salts of the acids, ammonium salts of the acids, and the like. (Sinha-OEIS)
W77-03872

THE INTEGRATION OF DESALINATION PLANT WITH EXISTING AUSTRALIAN WATER RESOURCES,
New South Wales Univ., Kensington (Australia). School of Nuclear Engineering.
L. G. Kemeny.
Journal of Hydrology (Amsterdam), Vol. 28, No. 2/4, p 429-448, 1976. 8 fig, 4 tab, 14 ref, 2 append.

Descriptors: *Desalination plants, *Water resources, *Australia, *Water supply, Water utilization, Arid lands, Coasts, Economics, Hydrologic aspects, Salinity, Freshwater, Water storage, Water distribution(Applied), Costs, Size sites, Energy.
Identifiers: Costing.

Two-thirds of Australian land is arid; even the well-watered coastal areas are prone to prolonged droughts. Thus, the capital investment in water supply storage and distribution facilities is very high. These economic and ecological conditions demand alternative sources of fresh water supplemetation, probably desalination. A summary of Australian water resources is given, including geographical distribution of surface discharge and runoff, typical salinities of underground waters, and permissible limits of salinity. Considered next are the patterns of fresh water usage and the related costing practice; these are subdivided into domestic, industrial and agricultural supplies. A description of an existing desalination plant on the Western Australian Coast is given. Finally, general factors influencing the integration of desalination plant with existing water resources in Australia are summarized; discussed are water storage and distribution; plant size, siting and energy source; and integration and costing studies. (Bell-Cornell)
W77-04018

3B. Water Yield Improvement

PHYSIOLOGICAL RESPONSES TO RAINFALL IN OPUNTIA BASILARIS (CACTACEAE),
California Univ., Riverside. Dept. of Biology.
For primary bibliographic entry see Field 2I.
W77-03622

SOIL MOISTURE RESPONSE TO SEVERAL LEVELS OF FOLIAGE REMOVAL ON TWO UTAH RANGES,
Oregon State Univ., Corvallis. Rangeland Resources Program.
For primary bibliographic entry see Field 2G.
W77-03629

AUGMENTATION OF 1968-1972 WINTER STORMS IN NEW MEXICO,
New Mexico State Univ., University Park. Dept. of Civil Engineering.
C. G. Keyes, Jr.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 102, No. HY12, Proceedings Paper 12616, p 1725-1735, December 1976. 6 fig, 1 tab, 6 ref, 1 append. Bu. Rec. 14-06-D-6803.

Descriptors: *Cloud seeding, *New Mexico, *Winter, *Storms, Computer programs, Evaluation, Meteorology, Precipitation(Atmospheric), Precipitation intensity, Snow, Snowpack, Temperature, Water management(Applied), Orography, Statistics.
Identifiers: *Jemez Mountains(NM), Data systems, Randomization, Equivalent potential temperature.

Scientific studies on winter orographic cloud seeding were conducted in the Jemez Mountains of northern New Mexico during the winters of 1968-1969 through 1971-1972. The objective specific components and accomplishments of the project were summarized. The 'meteorological partitioning technique' used in conjunction with the nonparametric statistical analysis indicated that future projects in northern New Mexico should use the 700-mb equivalent potential temperature optimum window until a more refined criteria can show better results in overall snowpack increase. This assumed optimum window resulted in a net seasonal increase of precipitation of about 28%, or 14.5 cm of equivalent water in 4 yr. Assuming an affected area of about 1,300 sq km, this increase would be about 49,000,000 cu m (40,000 acre-ft) of additional water on the ground per year of winter cloud seeding. (Jones-ISWS)
W77-03838

PRODUCT AND METHOD FOR REDUCING WATER LOSS THROUGH SOIL BY SEEPAGE,
Flintkote Co., White Plains, N. Y. (Assignee).
F. L. Califano, G. Stepien, Jr., and T. E. Russell.
U.S. Patent No. 3,979,916, 14 p, 10 tab, 2 ref; Official Gazette of the United States Patent Office, Vol 950, No 2, p 495, September 14, 1976.

Descriptors: *Patents, *Seepage, *Seepage control, *Water loss, *Sealants, Reservoir leakage, Bodies of water, Water control, Asphalt, Linings.

The object of this invention is to provide a composition for and a method for applying that composition to natural and man-made ground surfaces in water containment and transfer systems to impermeabilize them. The composition penetrates

and combines with the ground surface to a significant degree to form a tough, flexible and water impervious mass. The composition is comprised of an aqueous emulsion of asphalt including a cationic emulsifier, a nonionic surface active agent and elastomer solids. The compositions are adapted for spray, roller, brush or flooding, etc., application, on natural and man-made beds of rivers, ponds and other water impoundment and transfer structures. The stability of the emulsion is controlled so that penetration of the soil is achieved, and a flexible water impervious mass is obtained. (Sinha-OEIS)
W77-03863

3C. Use Of Water Of Impaired Quality

EFFECT OF UREA AND AMMONIUM SULPHATE APPLIED BEFORE SOWING ON SUDANGRASS SEEDLINGS,
California Univ., El Centro. Imperial Valley Field Station.
G. F. Worker, Jr.
Journal of Agricultural Science, Vol. 86, No. 1, p 17-21, February, 1976. 2 fig, 6 ref.

Descriptors: *Ureas, *Fertilizers, *Nitrogen compounds, *Crop response, *Sundangrass, *Ammonium compounds, Crops, Agriculture, Leaching, Irrigation practices, Irrigation, Infiltration, Nitrogen, Crop production, Evapotranspiration, Soil moisture, Field capacity, Root zone, Arid lands.

Nitrogen as well as other plant elements will be very important in the development and growth of crops on the Sahara sands of southeastern Libya. Studies were conducted to determine possible leaching or fixation problems in growing sundangrass when urea, ammonium sulphate plus triple superphosphate, and ammonium polyphosphate fertilizer were applied as a seed-bed application to the very sandy soils of the Libyan Sahara near the Kufra Oasis. The effectiveness of the nitrogen source was measured by plant color, leaf analysis, and seedling height. Results indicate that under these virgin sandy soil conditions, the ammonium sulphate and ammonium polyphosphate fertilizers applied to the seed bed were retained within the root zone in sufficient amounts to give a vigorous, non-deficient sudangrass seedling. Nitrogen from urea was deficient and presumed leached beyond reach of the seedling root when applied to the seed bed. Applied post emergence, however, urea was a very satisfactory source of nitrogen. (Jamail-Arizona)
W77-03633

DESERTIFICATION AND THE SALINITY PROBLEM IN AUSTRALIA,
University of New England, Armidale (Australia). Dept.of Geography.
For primary bibliographic entry see Field 4C.
W77-03741

USE OF EFFLUENTS FROM FERMENTATION PLANTS FOR FIELD IRRIGATION (ISPOL'ZOVANIE STOCHNYKH VOD GIDROLIZNYKH ZAVODOV DLYA OROSHENIYA POLEI),
For primary bibliographic entry see Field 5D.
W77-03814

IRRIGATION EFFICIENCY, A BIBLIOGRAPHY, VOLUME 2.
Office of Water Research and Technology, Washington, D. C.
For primary bibliographic entry see Field 3F.
W77-03968

3D. Conservation In Domestic and Municipal Use

LEGAL CONSTRAINTS ON URBAN WATER SYSTEMS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
N. S. Grigg.
Journal of the Urban Planning and Development Division, Proceedings of ASCE, Vol 99, p 137-145 (1973). 8p, 1 Chart, 27 ref.

Descriptors: *Colorado, *Water resources development, *Water conservation, *Water supply development, *Urban hydrology, *Community development, Legal aspects, Administration, Cities, Comprehensive planning, Governments, Optimum development plans, Planning, Regional development, Water policy, Water supply.

Intelligent and farsighted water management requires the use of various methods of problem/solution analysis. This article examines water management at the general planning and decision-making levels rather than at the technical design level and uses the 'systems approach' to offer solution to urban water management problems. Legal constraints often work against improvements offered in the management of water systems while at the same time influencing goal formulation and fulfillment. The water law in the United States is largely state law; to illustrate the various legal contracts, both local, state and federal, on a real system, the author uses a consideration and analysis of the Denver, Colorado, Metropolitan region. The need for agreement on regional goals is strongly emphasized so that more thorough analysis of large-scale improvements will be possible. (Welch-Florida)
W77-03692

LEAST COST CONTROL STRATEGIES IN URBAN DRAINAGE DESIGN -- A DYNAMIC PROGRAMMING APPROACH,
Washington Univ., Seattle. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W77-04007

3E. Conservation In Industry

AN INVESTIGATION OF CONDENSATES AND THEIR CONTRIBUTION TO EFFLUENT DISPOSAL FROM SUGAR MILLS. PART II. STUDIES ON THE REMOVAL OF ETHANOL FROM CONDENSATES,
Sugar Research Inst., Mackay (Australia).
For primary bibliographic entry see Field 5D.
W77-03601

CHEMICAL-INDUSTRY COSTS OF WATER POLLUTION ABATEMENT,
IR and T, Arlington, Va.
For primary bibliographic entry see Field 5D.
W77-03604

NESTLE AND POLLUTION CONTROL,
For primary bibliographic entry see Field 5D.
W77-03607

PILOT SCALE HIGH GRADIENT MAGNETIC FILTRATION OF STEEL MILL WASTEWATER,
Sala Magnetics, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5D.
W77-03609

REVERSE OSMOSIS FOR THE TREATME OF METAL WASTE SOLUTIONS,
Department of Energy, Mines and Resources, tawa (Ontario). Extraction Metallurgy Div.
For primary bibliographic entry see Field 5D.
W77-03610

POTENTIALS OF USING SPENT OXYG BLEACHING LIQUOR IN THE SULPHI PROCESS,
Vsesoyuznyi Nauchno-Issledovatelskii Inst Tsellyulozno-Bumazhnoi Promyshelenno Leningrad (USSR).
For primary bibliographic entry see Field 5D.
W77-03615

IN-PLANT, OUTSIDE POLLUTION EVI ENERGY SAVING TOP AATCC CONCERNS.
For primary bibliographic entry see Field 5G.
W77-03620

THE POTENTIAL FOR NUCLEAR A GEOTHERMAL POWER PLANT SITING IDAHO AS RELATED TO WAT RESOURCES,
Idaho University, Moscow, Dept of Civil gineering.
L. F. Heitz, Jr.
Available from the National Technical Infor tion Service, Springfield, VA 22161 as PB-263 Price codes: A06 in paper copy, A01 in microfi Idaho Water Resources Research Instit Moscow, Completion Report, March 1975. 10 24 fig, 4 tab, 107 ref. (M. S. Thesis supported Idaho Nuclear Energy Commission).

Descriptors: *Water cooling, *Nuclear po plants, *Geothermal studies, Temperature, W quality standards, *Idaho, *Sites, Thermal p tion, *Energy, Thermal power, Institutions. Identifiers: Uranium enrichment facilities, T mal effluent standards, *Thermal energy.

The basic purpose is to determine the availab of cooling water in the State of Idaho for us nuclear and geothermal power production uranium enrichment facilities. Part of the vestigation deals with physical requirements cooling water in power production, using ch and graphs to show various cooling requirem according to the system. Water laws and stand are also investigated indicating that EPA reg tions may limit and even eliminate once-thro cooling in Idaho. However, possible sites are n tioned should EPA standards relax based on a vey of existing supplies of water useable in coo energy facilities. Other methods for cooling as pumped storage reservoirs, irrigation ca and other storage-nuclear power plant comb tions are discussed as alternative means of c ing. Finally, the author's view presented on state's direction in terms of energy develop and institutional regulations, in terms of the ro thermal energy as a problem to be faced now in terms of the necessity of establishing a prog sive program to develop thermal power.
W77-03730

DEVELOPMENT DOCUMENT FOR EFFLU LIMITATIONS GUIDELINES AND N SOURCE PERFORMANCE STANDARDS THE COPPER, NICKEL, CHROMIUM, ZINC SEGMENT OF THE ELECTROPLAT POINT SOURCE CATEGORY,
Environmental Protection Agency, Washing D. C. Effluent Guidelines Div.
For primary bibliographic entry see Field 5G.
W77-03775

REDUCTION OF FRESH WATER CONSU TION AT THE KONDOPOGA MILL FOR MANUFACTURE OF PULP (OPYT RAB KONDOPOZHNOGO KOMBINATA

**KRASHCHENIYU RASCHODA SVEZHEI
)Y V TSELLYULOZNOM PROIZ-
)STVE),**
dopozhskii Kombinat (USSR).
Mamzelev.
azhnaya Promyshlennost No. 9, p 18, Sep-
er, 1976.

riptors: *Pulp and paper industry, *Water
ervation, *Water consumption(Except con-
otive use), *Water reuse, Pulp wastes, Water
tion control, Sulfite liquors, Wastes, Industri-
astes, Foreign countries, *Recycling, Waste
ment, Waste water treatment, Pollution
ement, Industrial water.
ifiers: *Sulfite pulp mills, Closed systems,
R.

h water consumption in the manufacture of
e pulp at the Kondopoga mill (USSR) was
ced from 180 to 71 cu m/ton in 1975 and to 54
in 1976. At the same time, the annual loss of
s with discharged effluents was reduced from
to 55 tons. This was accomplished through
ral measures aimed at closing the water cycle.
cled water is used in many processes, e.g.,
ooling sulfur dioxide in the gas scrubber, pulp
on, etc. Plans call for further reduction of
water consumption through expanded reuse
ater and better utilization of the spent sulfite
r (yeast-production and evaporation of the
fermentation liquor). (Stapinski-IPC)
-03790

**IUFACTURE OF BOXBOARD IN A
SED WATER CYCLE (PROIZVODSTVO
OBOCHNOGO KARTONA PRI ZAMKNU-
VODOOBOROTE),**
arvskaya Kartonnaya Fabrika (USSR).
Narymskaya, L. P. Zakharova, T. K.
rova, Y. V. Nikitin, and E. I. Vilenskaya.
azhaya Promyshlennost, No. 7, p 22-23, July,
1 fig, 2 tab.

riptors: *Water reuse, *Pulp and paper indus-
Water conservation, Water pollution control,
r consumption, Suspended solids, Organic
es, Inorganic compounds, Pulp wastes, Ef-
ts, Water management(Applied), Slime,
rculated water, Reclaimed water, Water pol-
n sources, Industrial water, Cooling water,
gn countries.
ifiers: *Board mills, Closed systems, White
r(Paper machines), Wash water, *USSR.

closed-circuit manufacture of boxboard has
tly been introduced at the Suoyarvi board
n USSR. The boxboard is produced from a
of waste paper stock and low-grade pulp.
otal water consumption is 36 cu m/ton, and
water losses up to 3.6 cu m/ton are replaced
esh water, the remaining 32.4 cu m/ton being
gically purified white water. This water
s the needs of two board machines for wash-
f cylinder molds, felts, and suction press
and for cooling of bearings and is also used
leaning vacuum filters of excess activated
e. The pollution level of the white water
ended solids, dissolved organic and inorganic
ances) increased slightly and reached a max-
after 8-10 days, then remained at a constant
with slight variations. No technical difficul-
ere experienced, and there was no slime for-
n. (Stapinski-IPC)
03791

**GN OF AN EFFICIENT WATER SYSTEM
A KRAFT PULP MILL,**
(Charles T.), Inc., Boston Mass.
rimary bibliographic entry see Field 5D.
03804

**ER TREATMENT FOR BOILER OPERAT-
PRESSURES ABOVE 1200 PSIG,**
yne Corp., Union, N. J. Graver Water Div.
non.

TAPPI Engineering Conference, Houston, October 4-7, 1976, Preprinted Proceedings Book I, (TAPPI, Atlanta, Ga.), p 136-139. 8 fig, 2 ref, 5 tab.

Descriptors: *Boiler feed water, *Water treatment, Industrial water, Demineralization, Water supply, Ion exchange, Equipment, Operating costs, Reverse osmosis, Membrane processes, Separation techniques, Costs, Chemicals, Capital costs, Corrosion control.

Boilers operating at 1200 psig and higher pressures require high-quality feedwater. Since this feedwater is normally one-half makeup and one-half condensate, treatment of both streams is necessary. Typical makeup water demineralizers for different water supplies and ion-exchangers for treatment of condensate are described. Equipment and operating costs for reverse osmosis treatment versus demineralization of water are compared. Present-day needs of high reliability, high chemical costs, as well as high initial costs, demand careful study of alternative treatment methods. (Witt-IPC)
W77-03805

REDUCTION OF DEPOSIT FORMATION IN HEAT EXCHANGERS (SNIZHENIE OSADKOOBRAZOVANIYA V TEPLOOBMENNOI APPARATURE),
For primary bibliographic entry see Field 8G.
W77-03808

GREAT LAKES (PAPER CO.) PIONEERS TOMORROW'S TECHNOLOGY,
For primary bibliographic entry see Field 5D.
W77-03809

UTILIZATION OF THE SPENT SULFITE LIQUOR COMPONENTS IN THE PEKILO PROTEIN PROCESS AND THE INFLUENCE OF THE PROCESS UPON THE ENVIRONMENTAL PROBLEMS OF A SULFITE MILL,
For primary bibliographic entry see Field 5D.
W77-03816

EXPERIENCES IN CLOSING THE WATER SYSTEM IN A PAPER AND BOARD MILL (ERFAHRUNGEN BEI DER KREISLAUFSCHLIESSUNG EINER PAPIER- UND KARTONFABRIK),
For primary bibliographic entry see Field 5D.
W77-03818

BIOLOGICAL EFFLUENT CLARIFICATION IN THE PAPER MILL CIRCULATION SYSTEM (BIOLOGISCHE ABWASSERAUFBEREITUNG IM KREISLAUF EINER PAPIERFABRIK),
For primary bibliographic entry see Field 5D.
W77-03824

NATIONAL ECONOMIC MODELS OF INDUSTRIAL WATER USE AND WASTE TREATMENT,
Houston Univ., Tex.
For primary bibliographic entry see Field 5D.
W77-03928

MODELING PROCESS SUBSTITUTIONS BY LP AND MIP,
Resources for the Future, Inc., Washington, D. C.
For primary bibliographic entry see Field 5G.
W77-03933

EXAMINATION OF ENVIRONMENTAL POLICIES USING PRODUCTION AND POLLUTION MICROPARAMETER DISTRIBUTIONS,
Tel-Aviv Univ. (Israel). Foerder Inst. for Economic Research.
For primary bibliographic entry see Field 6G.
W77-03961

GEOTHERMAL TECHNOECOSYSTEMS AND WATER CYCLES IN ARID LANDS,
Arizona Univ., Tucson. Office of Arid Lands Studies.
For primary bibliographic entry see Field 6G.
W77-03966

3F. Conservation In Agriculture

ISOLATION AND CHARACTERIZATION OF DROUGHT TOLERANCE IN A GRAIN SORGHUM (SORGHUM BICOLOR (L) MOENCH) RANDOMMATING POPULATION,
Arizona Univ., Tucson. Dept. of Plant Sciences.
For primary bibliographic entry see Field 2I.
W77-03623

YIELD RESPONSES OF TWO MAIZE CULTIVARS FOLLOWING SHORT PERIODS OF WATER STRESS AT TASSELING,
Buenos Aires Univ. (Argentina). Dept. of Ecology.
A. Soriano, and H. D. Ginzo.
Agricultural Meteorology, Vol. 15, p 273-284, 1975. 7 tab, 20 ref.

Descriptors: *Moisture deficit, *Crop response, *Droughts, *Moisture stress, *Corn(Field), Crop production, Stress, Growth stages, Water balance, Grains(Crops), Moisture availability, Moisture tension, Soil water, Soil moisture, Soil-water-plant relationships, Moisture content, Cereal crops, Sands.
Identifiers: Leaf water potential.

The response of most annual crops to drought strongly depends upon the developmental stage of the plants at the time water becomes limited, defined as the 'critical period'. There is not enough information to assess (1) whether drought at the critical period changes the pattern of dry-matter distribution in a mature plant and, provided it does, (2) how a new partition of dry matter affects grain yield. These possibilities were investigated on two maize hybrids, Abati No. 2 and DeKalb F880, grown in sand-water cultures outdoors. At tasseling, both cultivars were subjected to drought by withholding water from the plants. Leaf water potential at the end of each droughting treatment was usually higher in DeKalb than in Abati. Total dry matter and grain yields per plant in both hybrids were directly related to leaf water potential at tasseling in plants droughted for 0, 3, or 5 days. Six days of drought decreased the total dry-matter of DeKalb F880 to a value below that of Abati but the grain yield of the former hybrid was much higher than that of the latter. It is concluded that the responses exhibited by DeKalb F880 represent an important advantage for maize cultivars grown in areas where drought spells are likely to occur during the early growth of the ears. (Jamail-Arizona)
W77-03628

EFFECT OF UREA AND AMMONIUM SULPHATE APPLIED BEFORE SOWING ON SUDANGRASS SEEDLINGS,
California Univ., El Centro. Imperial Valley Field Station.
For primary bibliographic entry see Field 3C.
W77-03633

MOISTURE USE EFFICIENCY OF DRYLAND CROPS AS INFLUENCED BY FERTILIZER USE, III. OILSEED CROPS,
Central Arid Zone Research Inst., Jodhpur (India). Dry Farming Research Main Centre.
R. P. Singh, and Y. S. Ramakrishna.
Annals of Arid Zone, Vol. 14, No. 4, p 320-328, December, 1975. 6 tab, 3 ref.

Descriptors: *Oilseed crops, *Crop production, *Consumptive use, *Fertilizers, *Soil-water-plant relationships, Rainfall, Moisture content, Soil

moisture, Stress, Nitrogen, Irrigation efficiency, Moisture stress, Cereal crops, Crop response, Arid lands.

Oilseed crops are high value crops and adapt better than other cereal crops to moisture stress conditions. The impact of fertilizer use on drylands in improving the moisture use efficiency of various oilseed crops was investigated. Two separate field experiments were conducted and the results presented. Fertilizer use resulted in higher yields and moisture use efficiency of all the oilseed crops tested except for one experiment with groundnuts. Under late sown conditions, castor gave the highest moisture use efficiency, followed by sunflowers. In good rainfall years like 1973, groundnuts gave higher yield than castor and sunflowers and exhibited a higher moisture use efficiency. The data concerning total consumptive use and moisture use efficiency of all the oilseed crops tested is presented. On the whole, fertilizer use in oilseed crops resulted in higher yields and better moisture use efficiency. (See also W76-10186) (Jamail-Arizona)
W77-03634

ESTIMATING RELATIVE LEAF WATER CONTENT WITH A SIMPLE BETA GAUGE CALIBRATION,
Soil Conservation Service, Klamath Falls, Oreg.
For primary bibliographic entry see Field 7B.
W77-03635

REACTION PRODUCTS OF POLYPHOSPHATES AND ORTHOPHOSPHATES WITH SOILS AND INFLUENCE ON UPTAKE OF PHOSPHORUS BY PLANTS,
Kansas State Univ., Manhattan. Dept. of Agronomy.
Y. V. Subbarao, and R. Ellis, Jr.
Soil Science Society of America Proceedings, Vol 39, No 6, 1085-1088, November-December 1975. 7 fig, 3 tab, 8 ref.

Descriptors: *Phosphorus, *Corn(Field), Crop response, Nutrients, Fertilizers, Fertilization, Chemical reactions, Absorption.
Identifiers: *Polyphosphates, *Orthophosphates.

Ammonium polyphosphate and diammonium phosphate were compared as sources of P for corn in a growth chamber experiment with an alkaline-calcareous soil and a slightly-acid soil. Reaction products of the two P sources in soils and soil extracts correlated with results obtained in the growth chamber. Applied P increased dry weights, uptake of P by the plants, and available soil P in the slightly acid soil. Both sources of P effectively supplied P for plant growth on this soil. Ammonium and magnesium orthophosphates, formed as reaction products in the laboratory experiments when the two P fertilizer materials were added, should furnish sufficient P for plant growth. (Skogerboe-Colo St)
W77-03636

THE EFFECTS OF STREAMFLOW VARIATION ON PRODUCTION AND INCOME OF IRRIGATED FARMS OPERATING UNDER THE DOCTRINE OF PRIOR APPROPRIATION,
Economic Research Service, Fort Collins, Colo. Natural Resource Economics Div.
R. L. Anderson.
Water Resources Research Vol 11, No 1, p 15-22, February 1975. 5 fig, 11 tab, 4 ref.

Descriptors: Irrigation, *Irrigation practices, *Streamflow, *Prior appropriation, Water supply, Runoff, Variability, Water rights, *Crop production.

Many irrigated farms dependent upon varying streamflow frequently encounter periods of inadequate water supply because streamflow is inadequate to serve all water rights. Streams fed by mountain snowmelt exhibit sharply peaked hydrographs. During the peak runoff period most water rights can be served. Thereafter streamflow declines rapidly, and many of the later water rights are denied water. Farms that are prohibited from diverting water suffer reduction in crop yields and income. To get the most benefit from varying flow, streams must be closely monitored so that as many rights as possible can be served with the original flow and the return flow that occurs. (Skogerboe-Colo St)
W77-03637

LOSSES OF DIURON, LINURON, FENAC, AND TRIFLURALIN IN SURFACE DRAINAGE WATER,
Agricultural Research Service, Baton Rouge, La.
For primary bibliographic entry see Field 5G.
W77-03639

EFFECT OF DEW ON LEAF WATER POTENTIALS AND CROP RESISTANCES IN A PASPALUM PASTURE,
Department of Scientific and Industrial Research, Palmerston North (New Zealand).
J. P. Kerr, and M. F. Beardsell.
Agronomy Journal, Vol. 67, No. 5, p 596-599. September-October. 1975. 3 fig, 28 ref, 1 append.

Descriptors: *Dew, *Pastures, *Pasture management, *Evapotranspiration, Agriculture, Crop response.
Identifiers: *Leaf water potentials.

Opportunities for comparing the water status of crops when the presence or absence of dew is the main environmental variable are rare. Results are reported of such a comparison made on successive days on a paspalum pasture. Leaf water potentials were measured with a pressure chamber, and the energy balance method was used to determine evapotranspiration. Crop resistances were calculated from the micrometeorological data. The presence of dew halved the early morning crop resistances. The paspalum pasture did not appear to exercise stomatal control over evapotranspiration until most of the dew had evaporated. (Skogerboe-Colo St)
W77-03736

DESERTIFICATION: SYMPTOM OF A CRISIS,
International Center for Arid and Semi-Arid Land Studies, Lubbock, Tex.
For primary bibliographic entry see Field 4C.
W77-03737

HOSE OR PIPE FOR SPRINKLING OR IRRIGATION,
Interdisciplin Forschungsgesellschaft m.b.H. Entwicklungs K.G., Karsruhe (West Germany). (Assignee).
D. Kabai.
U.S. Patent No. 3,980,104, 4 p, 9 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 950, No 2, p 558, September 14, 1976.

Descriptors: *Patents, Irrigation, *Sprinkler irrigation, Irrigation practices, *Irrigation efficiency, Flow control, Water delivery, Fluid mechanics, *Pipes, *Hoses, Fertilization.

The invention provides a hose or pipe for sprinkling or irrigation in which the flow rate of fluid through the individual orifices remains constant and is equal along the length of the hose. This object is attained by providing a hose whose outlet orifices are apertures in an elastic material, e.g. rubber or plastic and are located in concave or convex bulges of the hose. These orifices experience a geometric deformation when the shape and curvature of the surrounding elastic material changes depending on the local, internal fluid pressure. The deformation of the orifices is such that the flow rate at the individual apertures rema the same over the entire length of the hose e though the internal local fluid pressure is differ at each orifice. When rigid pipes are to be u the outlet orifices are located in elastic ins which are placed in suitable periodic opening the rigid pipe and which effect the closure f tion. Since the out-flow rate remains cons along the length of the hose or pipe, the sprin installations can be very long, thus reducing need for multiple sprinkling or irrigation paratus. (Sinha-OEIS)
W77-03864

IRRIGATION PIPES WITH DRIPPER UN AND METHOD OF ITS MANUFACTURE,
G. Eckstein.
U.S. Patent No. 3,981,452, 3 p, 3 fig, 5 ref; Offi Gazette of the United States Patent Office, 950, No 3, p 1020, September 21, 1976.

Descriptors: *Patents, *Irrigation, Irrigation p tices, *Irrigation efficiency, Application eq ment, Pipes.
Identifiers: *Drip irrigation.

A dripper unit comprises a cylinder provided a continuous groove on its peripheral surfaces is tightly surrounded by a sleeve. The groove an integral inlet in the cylinder while an outl provided in the sleeve. The groove may be a tinuous spiral, may have a labyrinth path or be of any of the known shapes which reduce pressure of the water from the supply pipe so it leaves the dripper unit in a trickle. An irriga pipe is provided with a dripper unit in which dripper units constitute an integral part of the without the necessity of assembling them at th rigation site. With such a pipe much labor and is saved when laying the pipe for irrigation the units do not have to be attached at the requ spaces. (Sinha-OEIS)
W77-03871

GROUND WATER MANAGEMENT AND S FACE WATER DEVELOPMENT FOR IRRI TION,
Montana State Univ., Bozeman.
For primary bibliographic entry see Field 4B.
W77-03929

OPTIMIZATION OF CROP IRRIGAT STRATEGY UNDER A STOCHAS WEATHER REGIME: A SIMULATION STU
Texas A and M Univ., College Station. Dep Soil and Crop Sciences.
J. Ahmed, C. H. M. van Bavel, and E. A. Hiler
Water Resources Research, Vol 12, No 6, p 1 1247, December 1976. 5 fig, 2 tab, 26 ref.

Descriptors: *Irrigation efficiency, * response, *Water utilization, *Simulation a sis, *Optimization, Crops, Decision ma Weather, Texas, Sorghum, Soil, Atmosp Water resources, Management, Agriculture, puter models, Equations, Operations research rigation water, Water policy, Conservation.

A dynamic simulation model of the soil-wat mosphere-plant system is developed as a too irrigation decision making under a stoch weather regime and when water supplies limited. Crop yield, foliage development, water deficits, and irrigation decisions have treated as interdependent processes. Yield su tibility of the crop to water deficit is a functi crop growth stage. The stomatal regulatio transpiration by the crop has been accounte as well. The model is a closed loop dyn system, in which past irrigation decisions weather conditions affect the current as well a future response of the crop system, and sequently, the future irrigation decisions an overall water use efficiency. Determined ar optimal irrigation timing and quantities; estim

he associated yields, the water use efficien- and the trade-offs between water conserva- nd crop yield. The crop growth and yield ation consists of two parts: (1) a dynamic growth and plant behavior model under astic weather regime and specific irrigation gy; and (2) a seasonal crop stress computa- or the simulated crop with associated yield ates. The optimization criteria, water use ef- cy, is defined as the ratio of crop yield to amount of irrigation water used in its produc- Specific illustration is given by considering sorghum grown under weather conditions l for south central Texas. (Bell-Cornell)
03941

GATION EFFICIENCY, A BIBLIOG- HY, VOLUME 2.
e of Water Research and Technology, ington, D. C.
able from the National Technical Informa- ervice, Springfield, VA 22161 as PB-263 155, codes: A22 in paper copy, A01 in microfiche. r Resources Scientific Information Center rt OWRT/WRSIC 76-206, December 1976,

riptors: *Irrigation efficiency, iographies, Crop production, Drip irrigation, tion effects, Irrigation practices, Patents, ty, Soil moisture, Sprinkler irrigation, le irrigation, Water requirements, Water ation.

report, containing 346 abstracts, is another in ries of planned bibliographies in water rces produced from the information base rising SELECTED WATER RESOURCES racts (SWRA). Volume 2 covers the period March 1973 through September 1976 me 9, Number 18). Author and subject in- are included. (See also W73-09115)
03968

VATER QUANTITY IANAGEMENT AND ONTROL

Control Of Water On The urface

MATED WATER BALANCE FOR THE POSED HADITHA RESERVOIR ON THE IRATES RIVER IN IRAQ,
na Univ., Tucson. Dept. of Hydrology and Resources.
Al-Hadithi.
r of Science Thesis, 1976. 61 p, 6 fig, 15 tab,

riptors: *Water balance, *Reservoirs, rvoir storage, *Reservoir leakage, rvoir evaporation, Climatic data, Inflow, arge(Water), Hydrogeology, Evaporation, ge, Water loss, Water storage, Dams, Irriga- Flood control, Hydroelectric power, Reser- tes, *Pre-impoundment.
fiers: *Iraq, *Euphrates River(Iraq), ha Reservoir(Iraq).

raqi Government is considering the construc- f a dam on the Euphrates River to better con- vater for irrigation on the Mesopotamian to generate hydro-electric power, and to al- flooding. A study was conducted to esti- the magnitude of possible losses from the oir due to seepage and evaporation. All the onents necessary to estimate the water ce were themselves estimated. These in- d: inflow estimates based on the historical egime of the river but adjusted for the water ements in Syria and Turkey; evaporation he reservoir estimated from pan evaporation data; and seepage losses estimated by the Green and Ampt approach for infiltration. The estimated evaporation and seepage losses are expected to be about 14 percent of the inflow to the reservoir during the first ten years of operation. The water balance definitely shows that the quantity of water available for releases will not be sufficient to meet expected requirements on the Mesopotamian Plain. The development of operatin rules for the reservoir is suggested to minimize spills through the spillway and more effectively use the water (Jamail-Arizona)
W77-03625

CALIFORNIA WATER LAW IN PERSPECTIVE,
California State Water Resources Control Board, Sacramento.
For primary bibliographic entry see Field 6E.
W77-03689

LEGAL CONSTRAINTS ON URBAN WATER SYSTEMS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 3D.
W77-03692

ANALYSIS OF THE NATIONAL FLOOD INSURANCE ACT,
Florida Univ., Gainesville. School of Law.
For primary bibliographic entry see Field 6E.
W77-03693

ARTIFICIAL AND NATURAL LAKES,
Florida Univ., Gainesville. School of Law.
For primary bibliographic entry see Field 6E.
W77-03694

OWNERSHIP OF SUBMERGED LANDS IN FLORIDA,
Miami Univ., Coral Gables, Fla. School of Law.
For primary bibliographic entry see Field 6E.
W77-03695

LEGAL PROTECTION FOR FLORIDA WETLANDS,
Florida Univ., Gainesville. School of Law.
For primary bibliographic entry see Field 6E.
W77-03696

WATER RESOURCES DATA SYSTEM,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 7C.
W77-03728

THE APPLICATION OF HYMO TO STUDY AREAS OF SOUTHWESTERN WYOMING FOR SURFACE RUNOFF AND SOIL LOSS ESTIMATES,
Wyoming Univ., Laramie. Water Resources Research Inst.
V. E. Smith.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 968, Price codes: A03 in paper copy, A01 in microfiche. Water Resources Series No. 60, June 1976. 38 p, 20 fig, 5 tab, 7 ref.

Descriptors: *Wyoming, *Computer models, Hydrologic models, Rainfall-runoff relationships, Erosion, Range management, *Streamflow forecasting, *Soil loss, *Surface runoff, Soil conservation, Model studies, Rainfall, Water conservation.
Identifiers: Computer simulation, Streamflow records, Water supply forecasting, HYMO.

Ephemeral stream runoff and soil losses were estimated for small basins in southwestern Wyoming using HYMO, a computer model that computes runoff and soil loss from precipitation and basin characteristics. Computed runoff was compared to measured runoff in one basin and a sensitivity analysis was made of the model. The comparison and analysis pointed out critical input variables requisite to reliable results. Runoff and soil loss graphs were prepared for the study basins as indicators of the effects of changes in range management practices.
W77-03729

THE PROJECTED ECONOMIC IMPACT OF THE RICHARD B. RUSSELL DAM AND LAKE UPON SOUTH CAROLINA,
Clemson Univ., S. C. Dept. of Agricultural Economics and Rural Sociology.
For primary bibliographic entry see Field 6B.
W77-03735

ASSESSMENT OF FLOOD MANAGEMENT ALTERNATIVES AGAINST SOCIAL PERFORMANCE CRITERIA, PHASE II REPORT,
Institute of Public Administration, New York.
For primary bibliographic entry see Field 6F.
W77-03774

A MATHEMATICAL MODEL FOR SIMULATING WATER QUALITY UNDER NON-STEADY STATE CONDITIONS,
North Carolina State Univ., Raleigh. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W77-03831

SOME PROBLEMS IN THE STUDY OF THE INUNDATION OF RIVER FLOOD PLAINS BY AEROSPACE METHODS,
V. G. Prokacheva, and V. F. Usachev.
Soviet Hydrology, Selected Papers, No. 1, p 6-12, 1975. 5 fig, 2 tab, 21 ref. Translated from Trudy Gossudarstvennogo Gidrologicheskogo Instituta, No 205, p 40-54, 1975.

Descriptors: *Remote sensing, *Floods, *Flood plains, Aerial photography, Satellites(Artificial), Radar, Rivers, Flood peak, Flood data, Surveys, Aircraft, Photography, Mapping.
Identifiers: *Space photographs.

Many scientific and practical problems are associated with flood plain inundation and emptying. This paper reported investigation of the possibilities of recording the external picture of inundations by ground, aircraft, and space methods. It was concluded that the method of successive aerial photo surveys is a sufficiently reliable and objective means for obtaining data on the inundation of flood plains and flooding boundaries. However, there are many obstacles for its broad use. The labor and high cost of large-scale areal air photo surveys of an inundated flood plain permit use of this method only for small flood plain areas. An even more important limiting factor is the weather, which makes it very difficult, and sometimes impossible, to perform these surveys during a given stage on the flood plain. The use of aircraft radar surveys considerably broadens the possibilities of research. The examples cited of the use of radar images showed that they can be applied to hydrologic interpretation of flood plain inundations. Modern aircraft methods of aerial photo surveys can be used in practice to study only limited flood plain areas, i.e., for local investigations. Regional studies of the inundation and emptying of flood plains along an entire river are possible only from the material of high-altitude (space) surveys. (Sims-ISWS)
W77-03847

HYDROLOGIC ASPECTS OF SPACE INVESTIGATIONS OF THE EARTH'S SURFACE (LITERATURE SURVEY),
For primary bibliographic entry see Field 7B.

W77-03848

PRODUCT AND METHOD FOR REDUCING WATER LOSS THROUGH SOIL BY SEEPAGE,
Flintkote Co., White Plains, N. Y. (Assignee).
For primary bibliographic entry see Field 3B.
W77-03863

ERTS-1, A NEW WINDOW ON OUR PLANET,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7B.
W77-03875

SEEPAGE STUDY OF CANALS IN BEAVER VALLEY, BEAVER COUNTY, UTAH,
Geological Survey, Salt Lake City, Utah.
R. W. Cruff, and R. W. Mower.
Utah Department of Natural Resources, Salt Lake City, Technical Publication No 52, 1976. 45 p, 12 fig, 2 tab, 3 ref.

Descriptors: *Seepage, *Canal seepage, *Water loss, *Return flow, *Groundwater movement, Percolation, Gradients(Streams), Flow measurement, *Utah.
Identifiers: Beaver County(Utah), Water gains, *Beaver River Valley(Utah).

A study of water gains or losses of nine canals near Beaver, Utah, was made to aid in the water allocation of the canal systems. The canals included are Manderfield Ditch, Last Chance Canal, Christiansen Ditch, Mammoth Canal, City Ditch, Owens Ditch, South Field Ditch, Patterson Ditch, and Aberdare Canal. Four sets of seepage measurements were made during 1974, but flow was observed in all nine canals only during the set of measurements made in June. Adjustments for fluctuations in flow in the canals were made from information obtained from water-stage recorders operated at selected locations along the canals during the time of each seepage run. The canals studied in Beaver Valley have small to moderate gains or losses. The total average loss for all nongaining reaches, which have an aggregate length of 21.2 miles, was 4.8 cfs (cubic feet per second). During the seepage runs and average total of 200.6 cfs entered the nongaining reaches. The gaining reaches have an aggregate length of 4.1 miles. Most of the water that is lost from canals reappears in lower canals or the Beaver River and its tributaries. (Woodard-USGS)
W77-03880

WATER AVAILABILITY, QUALITY, AND USE IN ALASKA.
Geological Survey, Anchorage, Alaska.
For primary bibliographic entry see Field 6B.
W77-03883

WATER RESOURCES DATA FOR NEBRASKA, WATER YEAR 1975,
Geological Survey, Lincoln, Nebr.
For primary bibliographic entry see Field 7C.
W77-03885

MAGNITUDE AND FREQUENCY OF FLOODS IN NEBRASKA,
Geological Survey, Lincoln, Nebr. Water Resources Div.
For primary bibliographic entry see Field 2E.
W77-03886

WATER RESOURCES OF EL PASO COUNTY, COLORADO,
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 6D.
W77-03890

RESERVOIR-SYSTEM MODEL FOR THE WILLAMETTE RIVER BASIN, OREGON,
Geological Survey, Jackson, Miss. Water Resources Div.
For primary bibliographic entry see Field 2E.
W77-03891

HYDROLOGIC UNIT MAP--1974, STATE OF COLORADO.
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W77-03893

WATER AVAILABILITY OF JEFFERSON COUNTY, ALABAMA,
Geological Survey, Tuscaloosa, Ala. Water Resources Div.
A. L. Knight.
Alabama Geological Survey, University, Map 167, 1976. 31 p, 5 fig, 2 plates, 5 tab, 22 ref.

Descriptors: *Water resources, *Surface waters, *Groundwater, *Water quality, *Hydrologic data, Streamflow, Flow rates, Aquifer characteristics, Water yield, Water levels, Available water.
Identifiers: *Jefferson County(Ala).

The average annual precipitation in Jefferson County, Alabama, is about 53 inches or about 2,820 mgd (million gallons per day). About 1,130 mgd runs off directly into streams, and the remaining 1,690 mgd replenishes soil moisture to underground reservoirs. Potential sources of ground water are limestone, dolomite, sandstone, and chert aquifers. Wells developed in these aquifers may produce as much as 0.5 mgd per well. In some areas, wells developed in the limestone, dolomite, and chert aquifers may produce more than 0.5 mgd per well. Water from the limestone and dolomite aquifers generally is moderately hard to very hard, contains less than 0.3 mg/liter iron, and has a median value of 150 mg/liter dissolved solids. Water from the sandstone aquifer generally is soft to moderately hard, contains iron in excess of 0.3 mg/liter, and has a median value of 210 mg/liter dissolved solids. Potential sources of surface water in Jefferson County are the Black Warrior and Cahaba Rivers, Locust Fork, and Valley, Village, Fivemile, Shades, and Turkey Creeks. Average flows at the mouth of these streams or at the point where the stream leaves the county are 4,070, 250, 1,230, 360, 100, 120, 100, and 90 mdg. (Woodard-USGS)
W77-03894

MODEL UNCERTAINTY IN FLOOD FREQUENCY ANALYSIS AND FREQUENCY-BASED DESIGN,
Waterloo Univ. (Ontario). Dept. of Civil Engineering.
B. Bodo, and T. E. Unny.
Water Resources Research, Vol. 12, No. 6, p 1109-1117, December 1976. 8 fig, 6 tab, 21 ref.

Descriptors: *Water resources, *Flood frequency, *Flood control, *Decision making, *Analytical techniques, *Probability, Economics, Optimization, Flood plains, Statistical methods, Arizona, Equations, Mathematical models, Systems analysis.
Identifiers: *Uncertainty, *Bayesian methods, Likelihood function, Bayesian inference, Benefit maximization.

Constrained by computational feasibility, attempts to describe random natural pnenomena of complex origin analytically can lead to a multiplicity of simplistic potentially representative model forms, as has occurred in the case of flood frequency analysis. Classical statistical methods inadequately confront this model uncertainty. Likelihood and Bayesian methods are presented and shown to permit inference concerning the relative goodness of several potential model candidates with respect to a given set of flood events. The Bayesian inferences are further combined within a deci theoretic structure for examining the anticip economic consequences of model uncertainty garding decisions concerning flood protec levels. The objective of the decision analysis determine that alternative which maximizes expected utility or benefit. For illustrative poses, the method has been applied to the deci analysis of flood protection design for the Ri Creek floodplain in Arizona. Results of this p show that Bayesian methods supply more pre infromation but require greater effort. Sin model world of simplistic forms may neve defined absolutely, both decision and infer remain subject to the astute judgment of analyst. (Bell-Cornell)
W77-03940

MULTIPURPOSE DEVELOPMENT ON TISZA RIVER.
Water Power, Vol. 26, No. 3, p. 102-103, 19 fig.

Descriptors: *Foreign projects, *Dams, *Mult purpose projects, *River basin developm Comprehensive planning, Potential water su Transportation, Navigable rivers, Impoundm Powerplants, Hydroelectric plants, Engine structures, Multiple-purpose reservoirs, Eur Irrigation.
Identifiers: *Tisza River(Hungary), Barr Kiskore(Hungary).

A new dam across Hungary's Tisza River, o four projected barrages on the river schedule completion by the end of the century, will t 25-mile stretch of the waterway into a three- wide impoundment and will raise the water 15-30 feet. The barrage, recently opened nea village of Kiskore in eastern Hungary, consi three main parts--the dam itself, the sluice and a power station which will have an eve capacity of 28 MW and will generate 106 GW electricity each year. The impoundment wi filled in two stages. The first and lower part provide 100 million cubic meters of water, an eventual capacity will be four times that am The new dam will ultimately provide irrigatio 700,000 acres of arid land in the Hungarian ag tural plain. The dam has made an addition miles of the river navigable all year-around cluding what were some of the shallowest rea total goods transported each year is thereb pected to increase from 150,000 to 4.2 million Three irrigation networks branching out Kiskore will provide water for 500 large- cooperative and state farms, affecting about villages and hamlets. (Harris-Wisconsin)
W77-03957

A SELECTED ANNOTATED BIBLIOGRA ON THE ANALYSIS OF WATER RESOU SYSTEMS, SEVENTH VOLUME.
Office of Water Research and Techno Washington, D. C.
For primary bibliographic entry see Field 6A.
W77-03967

LEGAL PROBLEMS IN CHANGING USES COORDINATING USES OF KEYHOLE RE VOIR,
Wyoming Univ., Laramie. Water Reso Research Inst.
For primary bibliographic entry see Field 6E.
W77-03973

CONTROL OF FJORDIC DEEP WA RENEWAL BY RUNOFF MODIFICATION,
Dunstaffnage Marine Research Lab., (Scotland).
For primary bibliographic entry see Field 2L.
W77-03975

GE IN SOME ELEMENTS OF THE R REGIME IN THE LOWER OB' REGION FLOW REGULATION (IN RELATION THE REDISTRIBUTION OF WATER URCES IN THE CENTRAL REGION),
miya Nauk SSSR Moscow. Institut afii.
Malik.
Hydrology, Selected Papers, No. 2, p 70-vember 1975. 2 fig, 3 tab, 8 ref. Translated Vestnik Moskovskogo Universiteta, afiya, No. 1, p 70-76, 1975.

ptors: *Rivers, *Backwater, *Water levels, , Foreign countries, Foreign research, Regulated flow, River regulation, Ground-Infiltration, Bogs, Forecasting, Model stu-

iers: *USSR, *Siberia, *Ob' River(USSR).

anned diversion of part of the runoff of Siberian rivers to the south requires that ogists forecast the most important elements river regime which have an unfavorable ef- the development of natural processes in ively wet regions. Backwater is one of those rable elements. Hydrologists dealing with have given their attention to this problem e of the necessity of determining the chain or, including hydrologic, causing rapid bog pment in West Siberia; and, also, because planning of the Lower Ob' hydroelectric station, whose construction will produce ious backwater along tributaries. The need cast the changes in natural conditions in the Region, following the planned redistribu-runoff, required the development of special ls because of the limited information availa-backwater in the rivers of the West Siberian the development of special methods for ting the parameters of backwater zones for gion and for determining their relation with ater-producing factors. Using the newly ped method, according to which backwater are determined as a function of the am- of the stages in the main backing-up rivers the low-flow slopes of the rivers being up, computations were made for the eristics of the backwater zones of 13 tribu- f the Lower Ob' (second-order rivers) and Lesser Sos'va (third-order river), a tributary Northern Sos'va. The computations were or the period of maximum flood stages in in backing-up rivers (Ob' and Northern from the data for 1966, which was a high- ar over most of the region, and from long- mean data. (Sims-ISWS)
989

IVARIABLE FLOOD LEVEL FREQUEN-STRIBUTIONS,
M. M.), Ltd., Toronto (Ontario).
mary bibliographic entry see Field 8B.
996

COST CONTROL STRATEGIES IN DRAINAGE DESIGN -- A DYNAMIC RAMMING APPROACH,
gton Univ., Seattle. Dept. of Civil En-g.
e.
cal Report No. 46 University of Washing-llege of Engineering. *Charles W. Harris lics Laboratory. Department of Civil En-g, Seattle, November 1975. 166 p, 31 fig, 8 ref, append.

tors: *Urban drainage, *Networks, ic programming, Storage, Conveyance es, Optimization, Simulation analysis, Estimating, Digital computers, Hydraulic Methodology, Equations, Mathematical Systems analysis, Design.
ers: *Cost minimization.

An approach to determine least cost control strategies in urban drainage network design has been developed. The networks are defined as cominations of conveyance and storage elements, where the conveyance elements are circular cross-section conduits, junction and diversion structures and pump stations. The storage basins are ponds and retention basins of different configurations. With network layouts established through a preliminary planning process, it is postulated that a unique least-cost combination exists of conveyance and storage elements to each identified network alternative. The problem is formulated as an N-stage sequential process using dynamic programming to determine at least cost solution. The dynamic programming approach is coupled with hydraulic simulation and cost-estimation models and is structured to handle serial and converging networks, and is shown to converge to the global optimum. The model is programmed in FORTRAN IV and has been implemented on a digital computer. The hydraulic model consists of a design module and a simulation module. It is concluded that significant cost reductions can be achieved using these methodologies. (Bell-Cornell)
W77-04007

APPLICATION OF GAME THEORY IN WATER MANAGEMENT,
Water Resources Center, Budapest (Hungary).
For primary bibliographic entry see Field 6A.
W77-04009

4B. Groundwater Management

A SUBSURFACE STUDY OF THE MESA GEOTHERMAL ANOMALY, IMPERIAL VALLEY, CALIFORNIA,
Colorado Univ., Boulder. Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 2F.
W77-03771

IDENTIFICATION OF GASOLINE CONTAMINATION OF GROUNDWATER BY GAS CHROMATOGRAPHY,
New York State Dept. of Health, Albany. Div. of Labs. and Research.
For primary bibliographic entry see Field 5A.
W77-03796

ANALYTIC SOLUTIONS FOR DRAWDOWNS IN RECTANGULAR ARTESIAN AQUIFERS,
Birmingham Univ. (England). Dept. of Civil Engineering.
Y. K. Chan, N. Mullineux, and J. R. Reed.
Journal of Hydrology, Vol. 31, No. 1/2, p 151-160, September 1976. 1 fig, 1 tab, 6 ref, 2 append.

Descriptors: *Equations, *Drawdown, *Artesian aquifers, Groundwater, Pumping, Wells, Boundaries(Surfaces), Homogeneity, Potentiometric level, Numerical analysis, Steady flow, Observation wells, Mathematical models.
Identifiers: *Integral transforms, Images, Rectangular aquifers, Hyperbolic functions, Convergence.

Analytical solutions for the drawdowns due to a single well pumping at a constant rate from a rectangular homogeneous artesian aquifer were obtained using the method of integral transforms for a variety of boundary conditions. The computational effort was shown to be small in comparison with that needed in employing the method of images. The method can be used in problems in which the method of images fails. (Visocky-ISWS)
W77-03854

HYDROLOGY OF THE SOLID WASTE BURIAL GROUND, AS RELATED TO THE POTENTIAL MIGRATION OF RADIONUCLIDES, IDAHO NATIONAL ENGINEERING LABORATORY,
Geological Survey, Boise, Idaho. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-03874

SUMMARY APPRAISALS OF THE NATION'S GROUND-WATER RESOURCES--ARKANSAS-WHITE-RED REGION,
Geological Survey, Lakewood, Colo. Water Resources Div.
M. S. Bedinger, and R. T. Sniegocki.
Available from the Supt. of Documents, GPO, Washington, DC 20402, Price $0.85. Professional Paper 813-H, 1976. 31 p, 21 fig, 5 tab, 77 ref.

Descriptors: *Groundwater resources, *Central US, *Evaluation, *Regional analysis, *Available water, Water demand, Water utilization, Aquifer characteristics, Hydrogeology, Water wells, Water yield, Climates, Semiarid climates, Colorado, Kansas, Oklahoma, Texas.
Identifiers: *Arkansas-White-Red Region.

The Arkansas-White-Red Region, an area of 265,000 square miles is characterized by diversity in geography, climate, and geology and, in turn, by diversity in water resources and water problems. The western semiarid part of the region is water deficient, that is, potential evapotranspiration exceeds precipitation. The eastern, humid part has a surplus. Water use in the region in 1970 averaged 10 billion gallons per day, of which more than 65 percent was ground water. The largest use of ground water was for irrigation of crops, mostly in the water-deficient areas of Texas, Oklahoma, Kansas, and Colorado. Because of its ready availability and widespread occurrence, ground water is used throughout the region to supply municipal and rural water needs. The most productive aquifers, capable of yielding more than 50 gallons per minute to individual wells are alluvium, carbonate rocks, gypsum, and sandstone. Fresh water in storage in aquifers in the region is estimated to be 2 billion acre-feet. In addition, a large unmeasured volume of saline water (containing more than 1,000 mg/liter of dissolved solids) underlies the fresh water at depths generally less than 500 feet. (Woodard-USGS)
W77-03877

GROUND-WATER RESOURCES OF THE HOLLOMAN AIR FORCE BASE WELL-FIELD AREA, 1967, NEW MEXICO,
Geological Survey, Albuquerque, N. Mex. Water Resources Div.
W. C. Ballance, and R. Mattick.
Open-file report 76-807, November 1976. 90 p, 15 fig, 7 tab, 6 ref.

Descriptors: *Groundwater resources, *Overdraft, *Drawdown, *Withdrawal, *Saline water intrusion, Water utilization, Water quality, Water supply, Military reservations, *New Mexico, Evaluation, Projections.
Identifiers: *Holloman Air Force Base(N Mex).

Water consumption at Holloman Air Force Base (HAFB), N. Mex., reached an all time high in 1964 and 1965. Further increases in withdrawal without expansion of pumping facilities will hasten the chemical deterioration of the ground water pumped from the well fields. Saline water in the well-field area is present on the north and west sides of the potable-water area and in a thin shallow zone that overlies the potable-water sands in part of the potable-water area. The latter source is affecting quality of the water produced from most wells. The saturated thickness of material underlying the Boles well field ranges from about 3,500 feet in the western part of the field to about 1,200 feet in the eastern part of the field. In the Douglass and San Andres well fields, the saturated thickness ranges from 3,500 feet to about 300 feet. Expansion of the Boles and San Andres well fields

to the east and southeast would move the center of pumping away from the highly saline water to the north and west. This would eliminate overpumping of the present wells that has resulted from the expanded facilities at Holloman Air Force Base. (Woodard-USGS)
W77-03878

ABATEMENT OF NITRATE POLLUTION IN A PUBLIC-SUPPLY WELL BY ANALYSIS OF HYDROLOGIC CHARACTERISTICS,
Geological Survey, Laguna Niguel, Calif.
For primary bibliographic entry see Field 5G.
W77-03879

PRELIMINARY DIGITAL MODEL OF GROUND-WATER FLOW IN THE MADISON GROUP, POWEDER RIVER BASIN AND ADJACENT AREAS, WYOMING, MONTANA, SOUTH DAKOTA, NORTH DAKOTA, AND NEBRASKA,
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 2F.
W77-03882

WATER AVAILABILITY, QUALITY, AND USE IN ALASKA.
Geological Survey, Anchorage, Alaska.
For primary bibliographic entry see Field 6B.
W77-03883

INTRODUCTION TO GROUND-WATER HYDRAULICS--A PROGRAMED TEXT FOR SELF-INSTRUCTION,
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 8B.
W77-03884

WATER RESOURCES DATA FOR NEBRASKA, WATER YEAR 1975,
Geological Survey, Lincoln, Nebr.
For primary bibliographic entry see Field 7C.
W77-03885

DISTRIBUTION AND TREND OF NITRATE, CHLORIDE, AND TOTAL SOLIDS IN WATER IN THE MAGOTHY AQUIFER IN SOUTHEAST NASSAU COUNTY, NEW YORK, FROM THE 1950'S THROUGH 1973,
Geological Survey, Mineola, N.Y. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-03887

GROUND-WATER LEVELS IN WYOMING, 1975,
Geological Survey, Cheyenne, Wyo. Water Resources Div.
W. C. Ballance, and P. B. Freudenthal.
Open-file report 76-598, July 1976. 170 p, 21 fig, 4 ref.

Descriptors: *Groundwater resources, *Water level fluctuations, *Observation wells, *Aquifers, *Wyoming, Water utilization, Irrigation, Municipal water, *Basic data collections, Hydrographs.

Ground-water levels are measured periodically in a network of about 260 observation wells in Wyoming to record changes in ground-water storage. The areas of water-level observation are mostly where ground water is used in large quantities for irrigation or municipal purposes. This report contains maps showing location of observation wells and water-level changes from 1975 to 1976. Well history, highest and lowest water levels, and hydrographs for most wells also are included. (Woodard-USGS)
W77-03888

GROUND-WATER RESOURCES AND GEOLOGY OF JEFFERSON COUNTY, WISCONSIN,
Geological Survey, Madison, Wis. Water Resources Div.
R. G. Borman, and L. C. Trotta.
Wisconsin Geological and Natural History Survey, Madison, Information Circular No 33, 1975. 31 p, 16 fig, 1 plate, 2 tab, 20 ref.

Descriptors: *Groundwater resources, *Water supply, *Water quality, *Water utilization, *Wisconsin, Aquifer characteristics, Pumping, Water yield, Hydrogeology, Water table, Groundwater movement, Groundwater recharge, Hydraulic conductivity.
Identifiers: Jefferson County(Wis).

A steadily increasing population in Jefferson County, Wisconsin, is expanding the need for ground-water supply. Good-quality water is available from the sand-and-gravel, Galena-Platteville, and sandstone aquifers. As much as 15 gpm (gallons per minute) can be obtained from wells almost everywhere in the county. Yields of more than 1,000 gpm are available from glacial drift where it contains a sufficient thickness of saturated sand and gravel. The Galena-Platteville aquifer is a dolomite that occurs mainly in the eastern one-half of the county and is locally more than 300 feet thick. Estimated well yields from this aquifer exceed 500 gpm. The sandstone aquifer underlies nearly the entire county except for small areas in the northwest corner. It is more than 1,100 feet thick in the southwest along the Dane-Jefferson County line. This aquifer is capable of yielding more than 1,000 gpm. The chemical quality of water from the three aquifers is similar. The water has a median hardness between 315 and 325 mg/liter. Median values for dissolved solids range between 325 and 349 mg/liter. Combined iron and manganese commonly exceed 0.3 mg/liter. About 13.0 gpm of ground water was pumped in the county in 1972, 87 percent from the sandstone aquifer. About 62 percent of the total water pumped was for industrial and commercial purposes, 26 percent for residential use, and 12 percent for municipal, irrigation, and institutional use. (Woodard-USGS)
W77-03889

WATER RESOURCES OF EL PASO COUNTY, COLORADO,
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 6D.
W77-03890

WATER AVAILABILITY OF JEFFERSON COUNTY, ALABAMA,
Geological Survey, Tuscaloosa, Ala. Water Resources Div.
For primary bibliographic entry see Field 4A.
W77-03894

GROUND WATER MANAGEMENT AND SURFACE WATER DEVELOPMENT FOR IRRIGATION,
Montana State Univ., Bozeman.
O. R. Burt.
In: Economic Modeling for Water Policy Evaluation (Ed. by Robert M. Thrall, et al.) North-Holland/TIMS Studies in the Management Sciences, Vol. 3, North-Holland/American Elsevier, New York, N.Y., 1976, p 75-95. 22 ref, 1 append.

Descriptors: *Groundwater, *Management, *Surface waters, *Irrigation, *Water resources development, *Dynamic programming, Aquifers, Methodology, Economics, Evaluation, Timing, Water delivery, Optimization, Water allocation(Policy), Conjunctive use, Hydrological aspects, Investment, Equations, Mathematical models, Systems analysis.
Identifiers: Equilibrium state, Iterative procedure, Decision rule, Benefit maximization.

In many groundwater basins, the timing of surf water development and the locations at wh water is delivered are economically intertwi with intertemporal allocation of groundwa stocks. Herein, these dependencies are analyz a quantitative economic framework is develop and a general model for optimal intertemporal a cation of groundwater among several hydrol cally interconnected aquifers is presented. Use conjuction with simulation analysis, this model ploits the notion of approximately optimal d sion rules obtained by a truncated Taylor's se approximation to the associated functional eq tion of dynamic programming. This approximat is reasonably accurate, since rate of change groundwater stocks is relatively small in rela to the size of stocks and because of the influe of an economic discount factor. It is hoped that simplifications proferred for the intertemporal location problem will make it feasible to evalua large number of different surface water syst for conjunctive use of ground and surface w and to evaluate the timing of delivery for surf water. The optimization criterion herein is ben maximization. (See also W77-03924) (Bell-Corn
W77-03929

GEOTHERMAL TECHNOECOSYSTEMS A WATER CYCLES IN ARID LANDS,
Arizona Univ., Tucson. Office of Arid Lands S dies.
For primary bibliographic entry see Field 6G.
W77-03966

THE APPLICATION OF BOREHO GEOPHYSICS TO THE SELECTION A MONITORING OF NUCLEAR WA DISPOSAL SITES,
Geological Survey, Lakewood, Colo. W Resources Div.
For primary bibliographic entry see Field 5E.
W77-03970

CHANGE IN SOME ELEMENTS OF T RIVER REGIME IN THE LOWER OB' REG UPON FLOW REGULATION (IN RELAT TO THE REDISTRIBUTION OF WA RESOURCES IN THE CENTRAL REGION),
Akademiya Nauk SSSR Moscow. Ins Geografii.
For primary bibliographic entry see Field 4A.
W77-03989

EARTHQUAKE-RELATED CHANGE OF T HYDROGEN ION CONCENTRATION (PH GROUND WATERS,
Akademiya Nauk Uzbekskoi SSR, Tashkent stitut Seismologii.
For primary bibliographic entry see Field 2K.
W77-03990

GROUND-WATER POLLUTION NEAR LANDFILL,
Rhode Island Univ., Kingston. Dept. of Civil Environmental Engineering.
For primary bibliographic entry see Field 5B.
W77-03991

PUMPING OF AQUIFER WITH VISCOELAS PROPERTIES,
Cornell Univ., Ithaca, N.Y. School of Civil Environmental Engineering.
W. Brutsaert, and M. Y. Corapcioglu.
Journal of the Hydraulics Division, Amer Society of Civil Engineers, Vol 102, No H Proceedings Paper No 12541, p 1663-1 November 1976. 1 fig, 40 ref, 2 append.

Descriptors: *Consolidation, *Aquifer cha teristics, *Theoretical analysis, *Soil physical perties, Aquifers, Groundwater, Pore pres Subsidence, Analysis, Soil mechanics, Mecha properties, Stress, Strain, Porous media.

...W. U. OF I. URBANA-CHAMPAIGN...

ntifiers: *Confined aquifers, *Viscoelasticity, eological properties.

land subsidence and the piezometric draw- n resulting from fluid withdrawal from a con- d aquifer system were analyzed. The aquifer erial was assumed to behave as a viscoelastic rchant body, representing both primary and ondary consolidation. The resulting ground- er flow equation was solved for the problem of teady radial flow in an extensive confined ifer of uniform thickness to a single fully etrating well, pumped at a steady rate of flow. nparison of the result for the special case of an tic aquifer with the Theis solution indicated for most practical situations, the obtained tion should yield good results. The parameters ne model, which are the hydraulic conductivity the compressibilities of primary and secondа- onsolidation, respectively, and the viscosity of secondary consolidation, can be derived from rds of piezometric drawdown and surface paction. (Adams-ISWS)
-03995

ATURATED ZONE AND VERTICAL-FLOW MPONENTS IN DRAINING UNCONFINED RMATIONS,
ningham Univ. (England). Dept. of Civil En- ering.
primary bibliographic entry see Field 2F.
-04000

Effects On Water Of Man's Non-Water Activities

L MOISTURE RESPONSE TO SEVERAL ELS OF FOLIAGE REMOVAL ON TWO H RANGES,
gon State Univ., Corvallis. Rangeland ources Program.
primary bibliographic entry see Field 2G.
-03629

ERTIFICATION: SYMPTOM OF A CRISIS,
national Center for Arid and Semi-Arid Land ies, Lubbock, Tex.
. Dregne.
Desertification: Process, Problems, Perspec- , Arid/Semi-Arid Natural Resources Program nar papers, University of Arizona, p 12-24, 1976. 6 fig.

criptors: *Deserts, *Arid lands, *Land agement, Planning, Dry farming, Crop uction, Soil-water-plant relationships, Im- (Rainfall), Economic efficiency, Human lation, Drought.
tifiers: *Desertification.

impacts of desertification on arid lands are ssed and ways of combatting the process, cially in economically poor nations, are out- . Desertification is defined as a process of im- rishment of arid, semiarid and some subhu- ecosystems due to human activities and ght. Effects include reduced productivity of able plants, accelerated soil deterioration, increased dangers for human occupation. s impact is the result of overpopulation and management of natural resources. Relatively nations are counseled to adopt a program of tive development in dryland and irrigated , one effect of which is increased crop uction. The components of such a program in- political commitment, rehabilitation of able areas, development of small-scale age) agriculture-based industries, and im- ement of the nation's economic and educa- base. (Jahns-Arizona)
03737

THE CONSEQUENCES OF FOOLING MOTHER NATURE,
Arizona Univ. Tucson. Dept. of Geosciences.
For primary bibliographic entry see Field 2B.
W77-03738

ATMOSPHERIC DUST AND SURFACE ALBEDO: EFFECTS ON DESERTIFICATION,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 2D.
W77-03739

SEGMENTS OF A VICIOUS CIRCLE: LAND DEGRADATION AND WATER RESOURCES,
Arizona Univ., Tucson. Dept. of Soils, Water, and Engineering.
W. G. Matlock.
In: Desertification: Process, Problems, Perspectives, Arid/Semi-Arid Natural Resources Program Seminar papers, University of Arizona, p 45-50, September 1976.

Descriptors: *Arid lands, *Land management, *Erosion, *Water resources development, *Soil-water-Plant relationships, Vegetation effects, Runoff, Infiltration, Rainfall, Sediment yield, Groundwater recharge, Floods.
Identifiers: *Land degradation.

Land degradation entails some or all of the following processes: reduction and ultimate elimination of desert vegetation; increased runoff rate and decreased surface moisture infiltration; greater soil erosion, eventually with some loss of soil fertility; and formation of mobile sand dunes and desert pavement. Sediment movement and rainfall reduction due to vegetation loss are discussed. Runoff-infiltration-vegetation relationships are influenced by the amount of ground cover, interception of moisture by vegetation, and the nature of the surface layer. Badly eroded land has been reported to increase the sediment load to 5,000 tons per square mile per year, 20 times the North American average. Effects of this are described, including those on the process of reservoir filling, which is accelerated by larger sediment loads. Another problem is that of violent floods that become higher in peak flow and shorter in duration. Also, direct recharge to groundwater aquifers is reduced. Surface water development may change river regimes and lead to abandonment of irrigated land during periods of reduced rainfall. Lower water levels cause a decrease in vegetative cover, contributing to erosion and consequent reduced recharge, thus decreasing groundwater availability. (Jahns-Arizona).
W77-03740

DESERTIFICATION AND THE SALINITY PROBLEM IN AUSTRALIA,
University of New England, Armidale (Australia). Dept.of Geography.
I. Douglas.
In: Desertification: Process, Problems, Perspectives, Arid/Semi-Arid Natural Resources Program seminar papers, University of Arizona, September 1976, p 87-106. 2 fig, 68 ref.

Descriptors: *Deserts, *Salinity, *Australia, *Land management, *Arid lands, Droughts, Sierozems, Saline soils, Land use, Hydrologic cycle, Saline water intrusion, Impact(Rainfall), Pasture management, Irrigation effects.
Identifiers: *Desertification.

Management of semiarid lands in Australia is difficult because of relict desert landforms and salt accumulations due to past climatic oscillations between wet and dry phases and because of the variability of the present-day climate. The extent of the arid zone was much greater in past dry periods; clearing and exploitation of land on present arid zone margins has altered the hydrologic cycle and may result in a return to those earlier dry conditions. The extent of the Australian arid zone is described, along with rainfall and soil characteristics, the impact of animals on the environment, pasture land use problems, irrigation impacts and other land developments. It is suggested that stabilized, vegetated dunes may become mobile, relict salt may reconcentrate to cause salt scalds, and erosion may strip surface soil and destroy the environment for good seed germination. The salinity problem is outlined, including its impact on agriculture. Almost all inland waters are dominated by sodium chloride; precipitation accounts for more salt in Australian rivers than in rivers elsewhere. (Jahns-Arizona).
W77-03741

DESERT REPAIRED IN SOUTHEASTERN OREGON: A CASE STUDY IN RANGE MANAGEMENT,
California Univ., Berkeley. Coll. of Natural Resources.
For primary bibliographic entry see Field 4D.
W77-03742

ASSESSMENT OF FLOOD MANAGEMENT ALTERNATIVES AGAINST SOCIAL PERFORMANCE CRITERIA, PHASE II REPORT,
Institute of Public Administration, New York.
For primary bibliographic entry see Field 6F.
W77-03774

EFFECTS OF FOREST CULTURAL TREATMENTS UPON STREAMFLOW,
Forest Station (USDA). Ogden, Utah. Intermountain Forest and Range Experiment Station.
W. F. Megahan.
The Forest Acts Dilemma Symposium, p 14-34, 1975. Proceedings Montana Forest and Conservation Experiment Station, University of Montana, 1976.

Descriptors: *Forest management, *Streamflow, *Lumbering, *Water quality, Water yield, Watershed management, Trees, Consumptive use, Microclimatology, Soils, Forest soils, Soil environment, Moisture availability.

Silvicultural operations and tree felling and logging practices affect a number of streamflow properties, including total quantity, timing, and quality of flows. The effects of silvicultural practices upon streamflow result from modifications in watershed functions caused by reduced water use by trees, changes in the microclimate of the forest site following tree removal, and soil disturbance created by overall timber harvesting operations. (Witt-IPC)
W77-03795

A COMPARISON OF MODELING AND STATISTICAL EVALUATION OF HYDROLOGIC CHANGE,
Melbourne and Metropolitan Board of Works (Australia).
For primary bibliographic entry see Field 4D.
W77-03800

WATER QUALITY MONITORING: KANEOHE BAY AND SELECTED WATERSHEDS JULY TO DECEMBER 1975,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 5B.
W77-03826

EQUALIZATION OF FLOW VARIATIONS IN COMBINED SEWERS,
Royal Inst. of Tech., Stockholm (Sweden). Dept. of Water Supply and Sewerage Engineering.
For primary bibliographic entry see Field 5D.
W77-03860

ALTERATION OF WATER REGULATING AND PROTECTIVE FEATURES OF THE FOREST UNDER INFLUENCE OF FORESTRY MEASURES, (IN RUSSIAN),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Lesovodstva i Mekhanizatsii Lesnogo Khozyaistva, Pushkino (USSR).
A. V. Pobedinskii.
Lesovedenie 4, p 3-11, 1975.

Descriptors: *Forest management, *Clear-cutting, *Soil erosion, Flow, Regulation, Forest soils, Lumbering, Reforestation, Erosion control, Water conservation.
Identifiers: *USSR.

Forestry measures (cuttings, mechanized removal of wood, forest restoration), carried out without consideration of forest needs, lead to the increase of surface flow, erosion and reduction of soil fertility. Investigations in different areas of the USSR produced recommendations on the rational use of forest resources, preservation and intensification of water regulative and protective properties of the forest.--Copyright 1976, Biological Abstracts, Inc.
W77-04002

4D. Watershed Protection

RAINFALL EROSIVITY ANALYSIS OF SOIL CONSERVATION RESEARCH CENTRE, VASAD(GUJARAT),
Guiarat Soil Conservation Research, Demonstration and Training Centre, Vasad (India).
A. Singh, C. M. Shah, and H. K. Kamannavar.
Indian Forester, Vol. 102, No. 2, p. 126-132, February, 1976. 2 fig., 3 tab., 3 ref.

Descriptors: *Erosion control, *Rainfall *Soil erosion, *Erosion rates, *Rainfall intensity, Erosion, Precipitation(Atmospheric), Rainfall-Runoff relationships, Rain, Surface runoff, Accelerated erosion, Rain water, Vegetation establishment, Soil management, Mathematical models.
Identifiers: *India.

Erosivity has been defined as the potential ability of rain to cause erosion. Erosion rates and effects of erosion in the Gujarat state of India are discussed and evaluated. Since rainfall is the main cause of erosion in the area, knowledge of its patterns can serve as an aid to the design and planning of soil conservation operations. Studies have shown that erosion is almost entirely caused by rainfall of high intensity. Thus, the study was confined only to those months receiving high intensity rainfall--June through September. There are two peak periods of intense rainfall. The first period attains its highest peak within a short period of two weeks in June and declines down to the minimum in the second week in August. Thus, the latter half of June is a crucial period of erosion hazard and land must be kept under cover as much as possible. A second peak period of intense rainfall begins in the third week of August and lasts for one month. The period between the two peak periods, from mid-July to mid-August is an important one for the application of vegetative control for soil conservation (Jamail-Arizona)
W77-03627

FRYINGPAN--ARKANSAS PROJECT COLORADO, FINAL ENVIRONMENTAL STATEMENT,
Bureau of Reclamation, Washington, D. C
For primary bibliographic entry see Field 8A.
W77-03702

THE APPLICATION OF HYMO TO STUDY AREAS OF SOUTHWESTERN WYOMING FOR SURFACE RUNOFF AND SOIL LOSS ESTIMATES,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 4A.
W77-03729

SEGMENTS OF A VICIOUS CIRCLE: LAND DEGRADATION AND WATER RESOURCES,
Arizona Univ., Tucson. Dept. of Soils, Water, and Engineering.
For primary bibliographic entry see Field 4C.
W77-03740

DESERT REPAIRED IN SOUTHEASTERN OREGON: A CASE STUDY IN RANGE MANAGEMENT,
California Univ., Berkeley. Coll. of Natural Resources.
H. F. Heady, and J. W. Bartolome.
In: Desertification: Process, Problems, Perspectives, Arid/Semi-Arid Natural Resources Program seminar papers, University of Arizona, p 107-117, Sept. 1976. 6 fig.

Descriptors: *Arid lands, *Oregon, *Range management, *Land reclamation, Livestock, Vegetation regrowth, Erosion control, Deserts.

A large-scale rangeland rehabilitation project in the Vale, Oregon, District of the Bureau of Land Management as example of successful repair of deteriorated rangeland. Characteristics of the area, is described grazing history and changes in ground cover are discussed, and the development of a rehabilitation program is outlined. The program included land treatment (by plow and seed, spray, wildfire rehabilitation, etc.) in only 10% of the district and improved livestock management. Benefits include a doubled grazing capacity, maintenance of ground cover and accumulation of plant litter on the soil surface, and consequent lack of erosion. Bluebunch wheatgrass and other native perennials have increased in density; a diversity of vegetation was encouraged. There has been a lower rate of erosion and sedimentation into the Owyhee Reservoir. (Jahns-Arizona).
W77-03742

A COMPARISON OF MODELING AND STATISTICAL EVALUATION OF HYDROLOGIC CHANGE,
Melbourne and Metropolitan Board of Works (Australia).
K. J. Langford, and J. L. McGuinness.
Water Resources Research, Vol. 12, No. 6, p 1322-1324, December, 1976. 1 fig, 12 ref.

Descriptors: *Forest management, *Watersheds(Basins), Hydrology, *Statistical models, *Model studies, Mathematical models, Reforestation, *Watershed management, Lumbering, Surface runoff, Water yield, Runoff, Vegetation effects.

The U.S. Department of Agriculture Hydrography Laboratory model of watershed hydrology is adapted for use on a research watershed where land use changed drastically as a result of reforestation and subsequent thinning. Eight years of measured runoff from a mature forest are used to estimate two of the model parameters; the remaining 39 are based on physical measurements. Model simulations properly evaluated both the magnitude and statistical significance of the hydrologic changes with much fewer data than were needed for standard statistical analyses. (Witt-IPC)
W77-03800

LABORATORY TECHNIQUES IN THE PREDICTION OF SOIL ERODIBILITY,
California Univ., Davis. Dept. of Civil Engineering.
L. Harder, K. Arulanandan, P. Rabbon, R. Green, and M. Wahler.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 093, Price codes: A03 in paper copy, A01 in microfiche. Department of Civil Engineering, (1976). 29 p, fig, 1 tab, 10 ref. (California Water Resources Center Project UCAL-WRC-W-502).

Descriptors: *Erosion, *Erosion rates, Dispersion, Laboratory tests, *Forecasting, *Soil erosion, *Shear stress, Rainfall simulators, Analytic techniques.
Identifiers: *Erosion predictions.

The purpose is to critically examine curre laboratory techniques used in predicting erosi loss. Three bench mark soils have been select and their engineering properties tested to yi parameters for this purpose. It was decided to i vestigate the shear stress required to initiate er sion and attempt to correlate results wi Wischmeier's Soil Loss Equation. Other tests i volved using Middleton's Dispersion Ratio, Fr Swell Test, Dielectric Dispersion, and the Att berg Limits in formulating erosion predictions. is hoped later these test results can be evaluat by erosion measurements performed on the so through field study and through the utilization o rainfall simulator. (Snyder-California, Davis)
W77-03827

AN EVALUATION OF SURFACE-MINE SPOI AREA RESTORATION IN WYOMING USIN RAINFALL SIMULATION,
Geological Survey, Lakewood, Colo. Wa Resources Div.
For primary bibliographic entry see Field 5B.
W77-03892

DETERMINING WATERSHED SUB-ARE WITH PRINCIPAL COMPONENT ANALYSIS,
Tobacco Tax Council, Richmond, Va.
V. G. Chappell, Jr.
Water Resources Bulletin, Vol. 12, No. 6, p 11 1139, December 1976. 1 fig, 3 tab, 7 ref.

Descriptors: *Water resourc *Watersheds(Basins), *River basins, *Statisti methods, *Social aspects, Effects, Economi Regions, Analytical techniques, Tennessee, Eq tions, Systems analysis.
Identifiers: *Principal component analy *Socioeconomic changes, *Economic sub-regio Multiple discriminant analysis.

The delineation of economic sub-regions enhan the study of socioeconomic changes that occu river basin communities. Moreover, the det mination of sub-regions exhibiting different ra of socioeconomic change allows for the appli tion of more specific projections and analys Principal component analysis (PCA) is a statisti technique which may be used to derive a stati cally valid, single-valued index of socioecono change from several socioeconomic variabl Herein, PCA is utilized to incorporate the effe of several such variables into an index watershed socioeconomic change. Among variables considered are rate of populat change, change in total property tax, change total payroll per capita, and change in median come of all families. The index is then used a basis for delineating economic sub-areas wit the Tennessee River Basin. PCA gives researcher the capability to reduce the multi dimensions of economic development into a sin dimension which can be used as an index socioeconomic change. (Bell-Cornell)
W77-04012

WATER QUALITY MANAGEMENT AND PROTECTION

.. Identification Of Pollutants

THE APPLICATION OF RADIOISOTOPE X-Y FLUORESCENCE ANALYSIS FOR THE LUTION OF ENVIRONMENTAL AND IN-STRIAL PROBLEMS,
aliches Forchungsinstitut Geochemisches, nberg (West Germany).
Meier, and E. Unger.
rnal of Radioanalytical Chemistry, Vol. 32, No. 413-445, 1976. 17 fig, 8 tab, 64 ref.

criptors: *Analytical techniques, *X-ray anal-, *Industrial wastes, *Water analysis, Air pol-on, Oil wastes, Metals, *Pollutant identifica-, *X-ray fluorescence.
ntifiers: *Petrochemical wastes, Radioisotope y analysis.

ioisotope X-ray analysis was the subject of ch interest because it is a portable and low cost lytical system. Equations were given from ch methods applicable to environmental analy- and industrial processes could be derived. hods were suggested which would be useful in lyzing air particles and polluted water. These uded quantitative analysis of elements of in-st in different matrices such as solutions, pow-s and bulk solids, as well as determination of ction limits in trace analysis. The low mass ab-tion coefficients of oils qualify them for anal- by this process. In engine oils, wear metals, n as iron, chromium, copper, and nickel may neasured. Additive elements in lubricating oils the sulfur content in fuel oils can be deter-ed. The latter application is important since e is often a need for rapid quantitative analysis sulfur in petroleum products. This can be ieved down to a detection limit of 60 ppm. ther experimentation is needed to develop the sibilities of radioisotope X-ray fluorescence niques in environmental and industrial appli-ons. (Collins-FIRL)
7-03612

ARACTERISTICS OF EFFLUENTS FROM NVENTIONAL AND OXYGEN BLEACHING QUENCES,
ional Council for Air and Stream Improve-t, Gainesville, Fla. Southern Research Center.
L. Carpenter, W. T. McKean, H. F. Berger, I. Gellman.
pi, Vol. 59, No. 11, p 81-84, November, 1976. 6 6 ref.

criptors: *Pollutant identification, chemical oxygen demand, *Chemical oxygen and, *Biological treatment, *Color, Chlorides, uents, Bleaching wastes, Laboratory studies, ste water treatment.

effluent characteristics from laboratory ching of softwood, hardwood kraft, and soft-d sulfite pulps by conventional sequences, IDED and CEH, respectively, are compared those from oxygen bleaching sequences EDED, OCED, COD, CODED, and D/COD, ectively. Bleached pulp was washed in the ratory with calculated amounts of distilled r, and the water was analyzed. Color, chloride entrations, biochemical oxygen demand D), chemical oxygen demand (COD), alkalini-acidity, and total, volatile, and fixed solids compared. Major reductions in effluent r, BOD, COD, and chloride concentration can alized by the selection of bleaching sequences cling of an alkali-oxygen stage for chemical very. The reductions obtained ranged from 60 0%. The reductions depend on choice of ence, initial pulp kappa number, and chemical charge required to produce a highly bleached pulp. The overall reductions for some of the analytes measured in the effluents paralleled earlier data. Only modest differences in loads were noted regarding regional pulp source. (Snyder-FIRL)
W77-03614

A NEW LABORATORY DEVICE FOR WASTE WATER ANALYSES (RESPIROMETER). PART II. MEASUREMENTS WITH BATCH OPERATION (UJ LABORATORIUMI SZENNYVISVIZSGALO KESZULEK (RESPIROMETER) II. RESZ. MERESEK SZAKASZOS UZEMMOD MELLETT),
W. Fleps.
Hidrologiai Kozlony, Vol. 56, No. 5, p 201-207, 1976. 7 fig, 1 tab, 3 ref.

Descriptors: *Analytical techniques, *Waste water treatment, *Monitoring, *Biochemical oxygen demand, *Nutrients, Biodegradation, Efficiencies, Toxicity, Measurement, *Pollutant identification, Respiration.
Identifiers: *Respirometers.

A respirator device for making waste water measurements in batch operation is described. The respirometer is capable of determining biodegradability, toxicity, nutrient demand, total biochemical oxygen demand, and the probable efficiency of treatment. The device also allows for a determination of the carbon and oxygen balance of degradation. (See also W75-05398) (Kreager-FIRL)
W77-03621

HEAVY METAL POLLUTANTS IN THE SEDIMENTS OF THE RHONE RIVER,
Geneva Univ. (Switzerland). Dept. of Earth Sciences.
For primary bibliographic entry see Field 5B.
W77-03651

SULPHIDE MEASUREMENT USING AMMONIUM MOLYBDATE,
Ontario Ministry of the Environment, Toronto. Sediment and Biomaterials Lab.
F. C. Darcel, and M. S. Ali.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p II-7-II-12, 3 fig, 1 tab, 5 ref.

Descriptors: *Analytical techniques, *Sulfides, Hydrogen sulfide, Waste water(Pollution), Waste water treatment, Industrial wastes, *Pollutant identification, Measurement.

A technique for sulphide measurement is discussed, in which the sample is acidified and the hydrogen sulphide released is displaced in acidified ammonium molybdate. A blue color is produced, the intensity of which is proportional to sulphide concentration. The system is capable of analyzing from 0.5 to 1000 micrograms sulphide as hydrogen sulphide in a wide range of natural waters and industrial wastes. The detection limit is routinely 0.02 ppm but this can be lowered to 0.002 ppm by increasing aliquot sizes. (See also W77-03642) (Chilton-ORNL)
W77-03657

ADSORPTION OF C14-DDT TO PARTICLE SURFACES,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Marine Ecology Lab.
For primary bibliographic entry see Field 5B.
W77-03658

MICROANALYSE DE L'INCORPORATION D'UN METAL LOURD DANS LES ECAILLES D'UN POISSON,
Institut National de la Recherche Scientifique, Rimouski (Quebec).
R. Van Coillie, R. Lapointe, A. Rousseau, and J. L. Sasseville.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p II-41-II-45, 2 tab, 13 ref.

Descriptors: *Analytical techniques, *Heavy metals, Fish, Cadmium, *X-ray analysis, *Pollutant identification.
Identifiers: Fish scales, *Microanalysis.

X-ray microanalysis as a technique for detecting metals present in fish scales is discussed. Results using this technique have been comparable to results using other known techniques. Use of the microanalysis method showed that in Carassius auratus, cadmium partially replaces Ca, Mg, Na and K in the scales when the fish remains in water containing 50 ppb of Cd. Replacement time was found to be 6-8 hours. The quantity of Cd absorbed and Ca, Mg, Na and K replaced was found to be limited. (See also W77-03642) (Chilton-ORNL)
W77-03663

THE FORM OF MERCURY IN FRESHWATER FISH,
Ontario Ministry of the Environment, Toronto. Inorganic Trace Contaminants Lab.
J. N. Bishop, and B. P. Neary.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p III-25-III-29, 4 fig, 2 tab, 25 ref.

Descriptors: Environmental effects, *Water pollution effects, *Mercury, Fish, Organic compounds, Freshwater fish, Pollutant identification.
Identifiers: *Methyl mercury.

The analytical data reported in this study were drawn from a group of approximately 600 fish representing 16 species. For the 16 species examined, the average methyl mercury to total mercury ratio ranged from about 82% to 95%. This value supports other research showing that essentially all of the mercury present in fish muscle is in the methyl form. The proportion of mercury present as methyl mercury was found to be independent of fish age, weight, length, or species. (See also W77-03642) (Chilton-ORNL)
W77-03673

WATER RESOURCES DATA SYSTEM,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 7C.
W77-03728

THE USE OF XAD-2 RESIN FOR THE ANALYSIS OF COPROSTANOL IN WATER,
Massachusetts Univ., Waltham. Dept. of Environmental Sciences.
C. K. Wun, R. W. Walker, and W. Litsky.
Water Research, Vol. 10, No. 11, p 955-959, 1976. 5 tab, 18 ref.

Descriptors: *Resins, *Coliforms, *Pathogenic bacteria, *Water pollution, *Analytical techniques, Bacteria, Sewage bacteria, Water pollution sources, Analysis, Water quality, Water analysis, Gas chromatography, *Pollutant identification, Chemistry, Instrumentation, Hydrogen ion concentration, Organic matter, Flow rates.
Identifiers: *Coprostanol, *XAD-2 resin, *Fecal coliform, *Coliform bacteria, *Fecal sterols, Resin column, Fecal pollution, Coliform organisms, Coliform tests, Public water supplies, Sterols, Organic contaminants, Hexane extraction, Resin mess size.

The use of Amberlite XAD-2 resin column for extracting 5 beta-cholestan-3 beta-ol (coprostanol), a fecal sterol, from water was studied. It was found

that the efficiency of the column extraction was comparable to that of the conventional liquid-liquid partitioning process. Maximum recovery from water samples depended upon pH of the sample, flow rate, resin mesh size, and concentration of coprostanol. The data suggest that the use of Amberlite XAD-2 resin columns for the quantitation of coprostanol may be employed effectively to supplement the enumeration of coliform bacteria as an indicator of fecal pollution of water. (Henley - ISWS)
W77-03767

ELECTRON CAPTURE GAS CHROMATOGRAPHIC METHODOLOGY FOR THE QUANTITATION OF POLYCHLORINATED BIPHENYLS: SURVEY AND COMPROMISE,
Canada Centre for Inland Waters, Burlington (Ontario).
A. S. Y. Chau, and R. C. J. Sampson.
Environmental Letters, Vol. 8, No. 2, p. 89-101, 1975. 2 fig., 7 tab., 10 ref.

Descriptors: *Analytical techniques, *Polychlorinated biphenyls, *Gas chromatography, Pesticide residues, Methodology, Aroclors, Laboratory tests, *Pollutant identification.
Identifiers: *Electron-capture gas chromatography.

An international survey of electron-capture gas chromatographic laboratory methods analyzing for PCBs indicated that a wide range of techniques and columns were employed resulting in considerable variation between chromatograms. The requirement for a reasonable compromise between accurate analysis and the ability to handle a large number of samples suggested the need for a uniform approach to quantitation of environmental PCB residues. Among the methods evaluated, it was determined that the Webb/McCall method best fulfills the survey objectives. By using the Aroclor composition tables prepared by Webb, the concentration of PCB represented by each gas chromatographic (GC) peak was determined from the product of mean weight percent PCB and total Aroclor concentration. Standard curves were prepared by plotting mean peak height against PCB concentration for each peak to investigate both the linearity of response of all the PCB GC peaks and the response of each peak in a particular PCB formulation relative to the same peaks in other preparations. The Webb method is more generally applicable to PCB analysis of residues from a wide variety of sources as it eliminates the mixed standards requirement; it will yield more realistic results in increasing complexity of the chromatogaram profile; and its underlying definitive logic and simplicity makes it more amenable to computerized data reduction methods. (Auen-Wisconsin)
W77-03779

SIMULTANEOUS DETERMINATION OF TOTAL, NON-CARBONATE AND CARBONATE WATER HARDNESS BY DIRECT POTENTIOMETRY,
Canada Centre for Insland Waters, Burlington (Ontario).
I. Sekerka, and J. F. Lechner.
Talanta, Vol. 22, p. 459-463, 1975. 3 fig., 2 tab., 15 ref.

Descriptors: *Analytical techniques, *Hardness(Water), *Computer programs, *Potentiometers, Calcium, Magnesium, Ions, *Carbonates, Data processing, Pollutant identification.

Various types of water hardness can be determined simultaneously by manual and automated direct potentiometry, using the bivalent ion-selective electrode and the known addition-known dilution technique. This automated and programmable system produces direct printout of total, non-carbonate and carbonate water hardness. Equipment and procedures used are detailed, with a block diagram showing equipment assembly. The on-line computer treatment of potentiometric measurements provides a printout in ppm of water hardness and eliminates additional graphic and mathematical operations. The computer program Algorithm and flow chart are given. On a single sample basis the manual procedure is at least 30 minutes shorter than the conventional method (20 and 50 minutes). The conventional serial analysis of 20 samples using simultaneous boiling, cooling and filtration of 20 samples plus successive measurements by titration takes about 100 minutes against 20 automated measurements at 3 minutes each for a total of 60 minutes. The manual procedure, with its inherent simplicy, inexpensiveness and speed, is most convenient for the analysis of small numbers of samples and in situ measurements, whereas the automated system improves the overall economy of serial analysis of large numbers of water samples. (Auen-Wisconsin)
W77-03780

GAS CHROMATOGRAPHIC DETERMINATION OF LOW CONCENTRATIONS OF HYDROCARBONS IN WATER BY VAPOR PHASE EXTRACTION,
Toronto Univ. (Ontario). Dept. of Chemical Engineering.
D. Mackay, W. Y. Shiu, and A. W. Wolkoff.
American Society for Testing and Materials Special Technical Publication 573, p. 251-258, 1975. 2 fig., 2 tab., 12 ref.

Descriptors: *Oil, *Analytical techniques, *Laboratory equipment, *Gas chromatography, Laboratory tests, Oil pollution, Instrumentation, *Pollutant identification, Organic compounds.
Identifiers: *Hydrocarbon measurement.

A laboratory appartus and method to determine low dissolved hydrocarbon concentrations and the thermodynamic basis for predicting the fraction of the hydrocarbon partitioning into the vapor phase is described. All parts of the equilibrium apparatus are of standard 316 stainless steel fittings. The ball valve has an orifice of 0.406 in. with a short length of 1/16-in. stainless steel tubing extended to the ball valve, which allows the upper chamber to be fully swept by carrier gas. The upper and lower chamber volumes are 18 cu and 100 cu cm, respectively. The apparatus is connected by 'Swagelock' Quick Connects to a Hewlett Packard Model 5750 Gas Chromatograph equipped with a flame ionization detector, and a heated gas sampling valve, modified by replacing one of the sample loops by two quick connectors which couple to the apparatus. It is important to ensure that there are no dead spaces in which some of the sample can be trapped. Sensitivity can be increased using larger volumes of water and improved accuracy can be obtained by increasing the number of calibrations. Reliable analyses are possible for alkanes down to 10 ppb and for toluene to 75 ppb. (Auen-Wisconsin)
W77-03781

ANALYSIS OF SIX BROADBAND OPTICAL FILTERS FOR MEASURING CHLOROPHYLL-A AND SUSPENDED SOLIDS IN THE PATUXENT RIVER,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
C. W. Ohlhorst.
NASA Technical Memorandum X-3399, July 1976. 49 p. 21 fig., 8 tab., 3 ref. 176-30-31-01.

Descriptors: *Remote sensing, *Chlorophyll, *Suspended solids, *Spectrophotometry, Cameras, Estuaries, *Maryland, Measurement, Optical properties, Estuarine environment, Indicators, *Pollutant identification.
Identifiers: *Spectral filters, *Spectral bandwidths, *Patuxent River(Md).

Six broadband optical filters were flown over th Patuxent River (Maryland) in 1972 to evalua their use in remotely measuring total chlorophyll and suspended solids concentrations, as part of program to determine spectral bandwidths neede to measure remotely various water quality indic tors. The spectral range of the Kodak Wratten 89 filter (690 to 900 nm) showed promise for detecti gross changes in total chlorophyll-a levels estuarine waters. The filter-film system detect concentrations greater than 67 microgram/liter b did not detect concentrations lower than 28 micr gram/liter. There was some indication that the 6 to 900 nm band can be used to measure suspend solids concentrations in the 20 to 70 mg/l rang The broad spectral bands of 500 to 600 n (Wratten filters 57 and 58), 600 to 700 nm (Wratt filter 25), and 500-700 (Wratten filter 12) do not themselves seem capable of measuring to chlorophyll-a levels below 28 microgram/liter turbid waters. These spectral bands ranges show some promise in measuring the concent tion of total suspended solids in the range of 20- microgram/liter. The spectral band of 400-500 n (Wratten filter 47B) shows no indication of bei able to measure either total chlorophyll-a (l than 28 microgram/liter) or total suspended sol (20 to 70 microgram/liter range) in turbid estuari (Auen-Wisconsin)
W77-03785

DETERMINATION OF VOLATI HALOGENATED HYDROCARBONS IN WATE BY GAS CHROMATOGRAPHY,
Canada Centre for Inland Waters, Burlingt (Ontario).
K. L. E. Kaiser, and B. G. Oliver.
Analytical Chemistry, Vol. 48, No. 14, p 22 2209, December, 1976. 4 fig, 15 ref, 1 tab.

Descriptors: *Water analysis, *Pollutant ident cation, *Chlorinated hydrocarbons, Halogens, ganic compounds, *Gas chromatography, Wa pollution sources, Water properties, Wa chemistry, Water pollution, Analytical techniqu
Identifiers: Chloroform, Carbon tetrachlori *Halocarbons(Halogenated hydrocarbons).

A rapid method for the quantitative determinat of volatile halognated hydrocarbons, such chloroform, dichlorobromometha dibromochloromevethane, and cart tetrachloride in water is described. This metho based on the equilibration of the dissolved co pounds in water with a small volume of gase headspace under reduced pressure at eleva temperature. Headspace samples, so equilibrat are directly injected into conventional gas ch matograph inlets for rapid quantification of volatile compounds present. With a Ni-63 electu capture detector, quantitative determinations chloroform and similar compounds in the 0.1 to microgram/liter range in water samples of l than 60 ml are easily performed in about minutes. Several equilibrations can be perform simultaneously without difficulty. (Witt-IPC)
W77-03787

DETERMINATION OF ARSENIC, TUNGSTE AND ANTIMONY IN NATURAL WATERS NEUTRON ACTIVATION AND INORGAN ION EXCHANGE,
Los Alamos Scientific Lab., N. Mex.
E. S. Gladney, and J. W. Owens.
Analytical Chemistry, Vol. 48, No. 14, p 22 2222, December, 1976. 28 ref, 4 tab.

Descriptors: *Water analysis, *Ion exchan *Neutron activation analysis, *Arsenic co pounds, Analytical techniques, Water pollut sources, Water chemistry, Water properti Trace elements, Water quality, Separat techniques, *Pollutant identification.
Identifiers: *Tungsten, *Antimony, Alumin oxide.

xchange on aluminum oxide columns has used to quantitatively measure As, Sb, and water. This procedure requires short thermal on irradiations, rapid ion-exchange without ical manipulations, and short gamma-ray s on a Ge(Li) detector. Precisions of plus or 5% can be routinely obtained, and the fol- g detection limits have been achieved: As, ppb; Sb, 0.03 ppb; and W, 0.05 ppb. (Witt-

03788

TIFICATION OF 1,1,1-
HLOROACETONE (1,1,1-
HLOROPROPANONE) IN TWO DRINK-
WATERS: A KNOWN PRECURSOR IN
OFORM REACTION,
el Univ., Philadelphia, Pa. Dept. of Chemis-

Suffet, L. Brenner, and B. Silver.
onmental Science and Technology, Vol. 10, 3, p 1273-1275, December, 1976. 2 fig, 10 ref,

iptors: *Potable water, *Water analysis, itant identification, Ion exchange, Gas chro- graphy, Spectroscopy, Water supply, ination, Ammonification, Water purifica- Water treatment, Water pollution sources, pollution, Water quality, Separation iques, Chlorinated hydrocarbons, Organic ounds.
fiers: Trichloropropanone, Haloform reac-

Trichloroacetone (1,1,1- oropropanone), a known precursor in the orm reaction, was isolated from the drinking of two different river water supplies, using -line XAD-2 macroreticular resin and a con- us liquid-liquid extractor. The water was ad- to near pH 4 before it was passed through AD-2 resin. Gas chromatography/mass spec- py confirmation of the analysis is presented free chlorination and/or ammoniation at two supplies were practiced. (Witt-IPC)
03794

TIFICATION OF GASOLINE CON-
NATION OF GROUNDWATER BY GAS
OMATOGRAPHY,
York State Dept. of Health, Albany. Div. of and Research.
l'Acqua, B. Bush, and J. Egan.
al of Chromatography, Vol. 128, No. 2, p 0, December 8, 1976. 6 fig, 14 ref, 3 tab.

iptors: *Groundwater, *Gas chromatog- *Gasoline, *Pollutant identification, Fuels, ic compounds, Water analysis, Water pollu- ources, Analytical techniques, Chromatog- Water pollution.

dual components that make up different of gasoline, or gasolines of the same grade ced by different manufacturers, are resolved dentified by gas chromatography using l columns and a flame ionization detector. minants at levels as low as 0.5 iters/liter may be identified by the method if es of gasoline from the source of contamina- n be obtained for comparison. The method applied for routine analyses without the use histicated complements for the gas chro- aph. (Witt-IPC)
3796

OUS LEACHATE FROM WESTERN RED
R: EFFECTS ON SOME AQUATIC OR-
SMS,
ngton Univ., Seattle, Coll. of Fisheries.
mary bibliographic entry see Field 5C.
3799

AN AUTOMATIC, CONTINUOUS, MODULAR WASTEWATER MONITORING SYSTEM,
NUS Corp., Rockville, Md. Enviromental Monitoring Systems Dept.
G. R. Goldgraben.
Instrument Society of America, Advances in Instrumentation, Annual Conference (Houston, Texas), Vol. 31, Part 3, Paper no. 720, 7 p, ISA (Pittsburgh), October 11-14, 1976. 4 fig, 8 ref.

Descriptors: *Monitoring, *Waste water(Pollution), Industrial wastes, *Pollutant identification, Data collections, Instrumentation, *Sampling, *Automation, Effluents.

The real-time characterization of industrial and other aqueous effluents is feasible with a completely automated integrated system engineered by NUS Corporation (Rockville, Maryland) which provides a flexible and reliable management tool for meeting legal and operational requirements. Selection of instrumentation and related options permit the configuration to be custom-tailored to the desired degree of automation. (Brown-IPC)
W77-03801

WATER QUALITY MONITORING: KANEOHE BAY AND SELECTED WATERSHEDS JULY TO DECEMBER 1975,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 5B.
W77-03826

RIVER AND COOLING WATER TEMPERATURE FLUCTUATIONS,
Minnesota Univ., Minneapolis. Dept. of Civil Engineering; and Minnesota Univ., Minneapolis. St. Anthony Falls Hydraulic Lab.
For primary bibliographic entry see Field 5B.
W77-03834

AN INVESTIGATION INTO THE EFFECTS OF FORESTRY PLANTATIONS ON THE WATER QUALITY OF UPLAND RESERVOIRS IN NORTHERN IRELAND,
Ministry of Agriculture, Crumlin (Northern Ireland). Freshwater Biological Investigation Unit.
For primary bibliographic entry see Field 5B.
W77-03840

ACCUMULATION AND DISTRIBUTION OF TOTAL MERCURY IN ESTUARINE SEDIMENTS,
Bedford Inst. of Oceanography, Darmouth (Nova Scotia). Atlantic Geoscience Centre; and Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Environmental Marine Geology.
For primary bibliographic entry see Field 5B.
W77-03857

ERTS-1, A NEW WINDOW ON OUR PLANET,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7B.
W77-03875

WASTE-ASSIMILATION STUDY OF KOSHKONONG CREEK BELOW SEWAGE-TREATMENT PLANT AT SUN PRAIRIE, WISCONSIN,
Geological Survey, Madison, Wis. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-03876

GROUND-WATER RESOURCES OF THE HOLLOMAN AIR FORCE BASE WELL-FIELD AREA, 1967, NEW MEXICO,
Geological Survey, Albuquerque, N. Mex. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-03878

CHEMICAL AND PHYSICAL DATA FOR THE FLAMING GORGE RESERVOIR AREA, UTAH AND WYOMING, 1973-75,
Geological Survey, Salt Lake City, Utah.
For primary bibliographic entry see Field 7C.
W77-03881

WATER AVAILABILITY, QUALITY, AND USE IN ALASKA.
Geological Survey, Anchorage, Alaska.
For primary bibliographic entry see Field 6B.
W77-03883

WATER RESOURCES DATA FOR NEBRASKA, WATER YEAR 1975,
Geological Survey, Lincoln, Nebr.
For primary bibliographic entry see Field 7C.
W77-03885

GROUND-WATER RESOURCES AND GEOLOGY OF JEFFERSON COUNTY, WISCONSIN,
Geological Survey, Madison, Wis. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-03889

WATER RESOURCES OF EL PASO COUNTY, COLORADO,
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 6D.
W77-03890

WATER AVAILABILITY OF JEFFERSON COUNTY, ALABAMA,
Geological Survey, Tuscaloosa, Ala. Water Resources Div.
For primary bibliographic entry see Field 4A.
W77-03894

ANALYSIS OF POLLUTION FROM MARINE ENGINES AND EFFECTS ON THE ENVIRONMENT. SOUTHERN LAKES,
Environmental Science and Engineering, Inc., Gainesville, Fla.
For primary bibliographic entry see Field 5C.
W77-03900

EFFECTS OF SUSPENDED AND DEPOSITED SEDIMENTS ON ESTUARINE ORGANISMS - PHASE II,
Maryland Univ., Solomons. Natural Resources Inst.
For primary bibliographic entry see Field 5C.
W77-03901

CHEMICAL HAZARDS RESPONSE INFORMATION SYSTEM FOR MULTIMODAL ACCIDENTS (CHRISMA) (A REEVALUATION OF CHRIS FOR ALL MODES OF TRANSPORTATION),
Little (Arthur D.), Inc., Cambridge, Mass.
D. S. Allan, and G. H. Harris.
Available from the National Technical Information Service, Springfield VA 22161 as AD-A016 296, Price codes: A07 in paper copy, A01 in microfiche. U.S. Coast Guard Office of Research and Development Report No. CG-D-148-75, April 1975. 133 p, 10 fig, 1 tab, 6 append. DOT-CG-24, 655-A.

Descriptors: *Pollutant identification, *Accidents, *Hazards, *Transportation, *Water quality control, *Chemical hazards, *Water pollution, *Pollution abatement.
Identifiers: *Information systems, Health hazards, Hazardous materials, Environmental protection, Hexane, Hydrogen cyanide, Sulfuric acid, Chemical Hazards Response Information System (CHRIS).

The need for improved technical and other information for meeting emergencies connected with the transportation of hazardous materials, particularly actual or potential chemical discharges regardless of mode is examined. The Chemical Hazards Response Information System (CHRIS), under development by the United States Coast Guard to furnish in-depth guidance during emergencies involving waterborne transport, was seen as a likely prototype for other modes as well. Accordingly, a reevaluation of CHRIS has been conducted to determine the desirability of enlarging its scope to encompass all modes of transportation. It is concluded that the expanded system would indeed be beneficial in reducing losses to life, property, and the environment. The information system would be composed of a decentralized organization providing response guidance on request to local emergency services personnel, a computerized hazard assessment system operated at Headquarters, and three reference manuals furnished to all response organizations. A pretest of the basic system components and services is recommended before full-scale development in view of several potential difficulties: (1) the anticipated low frequency of need per user installation, (2) the very short response time available for effective action, and (3) the large number of disparate autonomous emergency response personnel who do not operate within a defined regional or national organization or communication system. (Sinha-OEIS)
W77-03903

DEVELOPMENT OF AN OIL-WATER POLLUTION MONITORING SYSTEM,
Naval Postgraduate School, Monterey, Calif.
T. M. Houlihan, and B. D. Tyler.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A014 552, Price codes: A05 in paper copy, A01 in microfiche. Report No. NPS-59Hm75071A, July 1975. 89 p, 29 fig, 8 tab, 8 ref, 4 append.

Descriptors: *Pollutant identification, *Oil pollution, *Monitoring, *Sampling, Analytical techniques, *Water pollution, Oil, Baseline studies, Environmental effects, *Water resources, Fuel oil.
Identifiers: *Outer Continental Shelf, Bilge water, Ballast water.

The progress made during FY75 in the fabrication and the testing of an automatic oil pollution monitoring system is documented. In the system developed, a Direct Difference method of Total Organic Carbon determination was utilized to ascertain oil concentrations. Using this monitor, it was possible to specify the concentration of any oil, independent of type, in an oil separator effluent sample. In the final phases of the study, preliminary investigations on prototype improvements were initiated and oil concentrations of bilge water samples were determined. (Sinha-OEIS)
W77-03908

AN OIL SLICK SAMPLING SYSTEM,
Coast Guard Research and Development Center, Groton, Conn.
S. H. Fortier, and J. R. Jadamec.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A010 708, Price codes: A02 in paper copy, A01 in microfiche. Report No. CG-D-71-75, Dec 1974. 22 p, 2 fig, 2 tab, 11 ref, 2 append.

Descriptors: *Oil spills, *Oil pollution, *Pollutant identification, *Analytical techniques, *Water pollution, *Baseline studies, *Environmental effects, *Resources development, Water resources, *Sampling.
Identifiers: *Outer Continental shelf.

An oil slick sampling system has been developed for routine sampling of oil spills for identification purposes. The system can effectively sample all types of oil spills, collecting enough sample for analysis by several analytical techniques. In 80% of the spills sampled, the system collected sufficient oil for analysis by fluorescence and infrared spectroscopic and thin layer and gas chromatographic technques. In the remaining 20%, the system collected sufficient oil for at least two of the above-mentioned techniques. The developed system is lightweight, compact and inexpensive. (Sinha-OEIS)
W77-03909

CRUDE OIL SPILLS RESEARCH. AN INVESTIGATION AND EVALUATION OF ANALYTICAL TECHNIQUES,
Bureau of Mines, Bartlesville, Okla. Bartlesville Energy Research Center.
C. A. Wilson, E. P. Ferrero, and H. J. Coleman.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-242 128, Price codes: A03 in paper copy, A01 in microfiche. Report of Investigations No. 8024, 1975. 32 p, 7 fig, 16 tab, 42 ref.

Descriptors: *Oil spills, *Oil pollution, *Analytical techniques, *Pollutant identification, *Water pollution, Environmental effects, *Baseline studies, Water resources, Chemical analysis.
Identifiers: *Outer Continental Shelf, *Crude oil, Coastal zone.

The Bureau of Mines started a continuing program to investigate and evaluate analytical techniques to assist governmental agencies to select simple, rapid, reliable methods for crude oil spill identification. Six crude oil samples were analyzed to evaluate gas-liquid chromatography, atomic absorption spectrophotometry, infrared spectoscopy, sulfur and nitrogen determinations, mass spectrometry, nuclear magnetic resonance spectroscopy, and ultraviolet spectrophotometry. Samples were studied from the following selected fields: El Morgan, Egypt; Duri, Indonesia; Minagish, Kuwait; Bachaquero, Venezuela; Gach Saran, Iran; and Prudhoe Bay, Alaska. These samples were chosen to represent high-production fields that are likely to be involved in oceanic transport. Over 50 years of Bureau of Mines analytical research on petroleum served as the basis for evaluation of the experimental results to determine which of the methods are effective techniques to identify crude oil spills. Gas-liquid chromatographic analysis, atomic absorption spectrophotometric analysis, and sulfur-nitrogen determinations are recommended as the most useful of the techniques investigated. (Sinha-OEIS)
W77-03910

MEASUREMENT OF VOLATILE AND NON-VOLATILE HYDROCARBONS IN SELECTED AREAS OF THE ATLANTIC OCEAN,
Exxon Research and Engineering Co., Linden, N.J. Analytical and Information Div.
R. A. Brown, T. D. Searl, and E. B. Prestridge.
Available from the National Technical Information Service, Springfield, VA 22161 as COM-75-11112, Price codes: A03 in paper copy, A01 in microfiche. Final Report to U.S. Department of Commerce, Maritime Administration, June 1975. 44 p, 9 fig, 5 tab, 6 ref, append. 5-38000.

Descriptors: *Atlantic Ocean, *Oil pollution, *Gases, Resources, *Sampling, Water resources, *Baseline studies, *Organic compounds, *Pollutant identification, Measurement.
Identifiers: *Outer Continental Shelf, *Hydrocarbons(Non-volatile).

An earlier study covered the measurement and interpretation of total dispersed nonvolatile hydrocarbons and extractable organics in the Atlantic and nearby waters. This report discusses results of a subsequent study in selected areas of the Atlantic Ocean. Samples were analyzed as collected from a previously sampled area around Iceland and near the coast of Greenland. Data for su face and subsurface (-10 meter) water agree wi previous measurements. A previously unsampl area off the northeast coast of South America w found to contain hydrocarbons and extractable o ganics at about the same level as the northe waters. Volatile (C4-C8) hydrocarbons were me sured in some surface and subsurface sampl from along the Gulf of Mexico/New York C tanker route. (Sinha-OEIS)
W77-03911

MARSH GAS FROM THE ATLANT COASTAL PLAIN,
Delaware Univ., Newark. Coll. of Marine Studie
For primary bibliographic entry see Field 2L.
W77-03913

APPLICATIONS OF ERTS IMAGERY A SHIPBOARD OBSERVATIONS TO COAST ENVIRONMENTS STUDIES. PART I - HYPE SALINE ENVIRONMENTS, PART II COASTAL CIRCULATION ANALYSIS,
University of Southern California, Los Angel Dept. of Geological Sciences.
For primary bibliographic entry see Field 2L.
W77-03921

DETERMINING THE CONCENTRATION OIL IN WATER SAMPLES BY INFRAR SPECTROPHOTOMETRY, PHASE I - SAMP AGING STUDY,
Naval Ship Research and Development Cen Annapolis, Md. Materials Dept.
S. Finger, H. Feingold, E. Timko, and S. Orbach
Available from the National Technical Infor tion Service, Springfield, VA 22161 as AD/A-040, Price codes: A06 in paper copy, A01 microfiche. Report No. NSRDC 4535, Decem 1974. 109 p, 10 tab, 7 ref, 4 append.

Descriptors: *Pollutant identification, Water p lution, *Oil pollution, *Analytica techniques, Sa pling, *Spectrophotometry, Oil wastes.
Identifiers: *Infrared spectrophotometry, *Ag studies(Oil).

Oil in water samples of Naval Distillate Fuel (NDFO) and steam Turbine Lubricating Oil (2190 TEP) at concentrations of 16 p/m and 100 were studied to determine and quantify aging to various types of degradation with time, u normal storage conditions. The purpose of sample aging study was to obtain information use in scheduling sample shipment and analysi a forthcoming inter-laboratory study of the concentration measurement technique, as wel to estimate the allowable delay in sample anal after field sampling. The results indicate agingdue to degradation of MS 2190 TEP lub in the samples is negligible and may be ignored about one month of sample storage time. A lo 95% confidence limit on the aging time for ND that will result in a drop of 10% in the initial centration (Prior to aging) is about two weeks. unexpected initial drop in oil concentration, wh is not attributable to microbial and other mode degradation, was noted in both oil types (the ef is more pronounced for NDFO). Possible ca for this apparent loss of oil are suggested further investigation is required to determine cause and to quantify it. (Sinha-OEIS)
W77-03922

LOSS OF SUBMERGED VEGETATION IN PENSACOLA BAY SYSTEM,
Environmental Protection Agency, Sabine Isl Fla. Escambia Bay Recovery Study.
For primary bibliographic entry see Field 5G.
W77-03946

ITNESS AND COLOR OF THE SEA
ER IN THE TAGONOURA-PORT, (IN
NESE),
i Univ., Shizouka (Japan). Faculty of Marine
ce and Technology.
atsume, T. Miyata, and T. Suzuki.
: Mar Sci Technol Tokai Univ 8, p 121-128,

riptors: *Sea water, *Color, Water pollution
es, Asia, *Colorimetry, *Pollutant identifica-
Turbidity.
ifiers: *Japan(Tagonoura-Port).

ollution of the Tagonoura-Port (Japan) was
d by observing the differences in the color of
ea water by colorimetry. The lightness
ased with decreased depth; the shallower the
the higher the tubidity. The lightness was
t at the mouth of the Numa River at all
s. The pollutant sources are in the Numa
. At all locations sampled, the sea water was
h yellow at 2 m and 5 m, and yellow at the
ce.--Copyright 1976, Biological Abstracts,

03965

L PILE LEACHATE - QUANTITY AND
LITY CHARACTERISTICS,
rd and Anderson, Auburn, N.Y.
rimary bibliographic entry see Field 5B.
03992

ONIAL AUKS AND EIDERS AS POTEN-
INDICATORS OF OIL POLLUTION,
dian Wildlife Service, Delta (British Colum-

rmeer.
e Pollution Bulletin, Vol. 7(No. 6), Sept.,
p. 165-167, 1 tab., 1 fig., 11 ref.

riptors: Oil, *Oil pollution, Water pollution
s, *Canada, *Water birds, *Wildlife,
mon Eider duck, Aquatic animals,
ndicators, Oily waters, Oil spills, Oil wastes,
ant identification.
fiers: *Colonial auk, Alcids, Murres, Com-
Eider, Western Arctic Sea birds, Western
land, Eastern Arctic.

ial auk (Alcid) populations can be used as in-
rs of the effects of oil pollution on the
ds of Canada's coastal zones. Of approxi-
y 11 million breeding colonial alcids in
la and in adjacent West Greenland waters,
re murres. Common Eiders may serve as the
ndicators of the effects of oil pollution in
la's western Arctic where colonial alcids are
. (Katz)
04029

G-TERM EFFECTS OF METHYLMERCU-
CHLORIDE ON THREE GENERATIONS
ROOK TROUT: TOXICITY ACCUMULA-
, DISTRIBUTION AND ELIMINATION,
onmental Research Lab., Duluth, Minn.
imary bibliographic entry see Field 5C.
04031

IMATION AND TOLERANCE OF AR-
A SALINA TO COPPER SALTS,
Univ. of Malta, Valletta. Dept. of Biology.
imary bibliographic entry see Field 5C.
04044

OCARBONS IN A WILDERNESS LAKE,
Research and Engineering Co., Linden,
nalytical and Information Div.
imary bibliographic entry see Field 5B.
04048

PETROLEUM COMPONENTS AND OBJECTIONABLE MALODOROUS SUBSTANCES IN FISH FLESH POLLUTED BY BOILER FUEL OIL,
Okayama Univ. (Japan). Dept. of Public Hygiene.
For primary bibliographic entry see Field 5C.
W77-04053

MERCURY IN TISSUES OF MUSSEL OFF SOUTHERN CALIFORNIA,
Southern California Coastal Water Research Project, El Segundo, Calif.
For primary bibliographic entry see Field 5C.
W77-04060

AN ASSESSMENT OF THE POLLUTION OF CORNISH COASTAL WATERS,
Atkins Research and Development, Epson (England).
For primary bibliographic entry see Field 5B.
W77-04061

PETROLEUM-DEGRADING ACHLOROPHYLLOUS ALGA PROTOTHECA ZOPFI,
Maryland Univ., College Park. Dept. of Microbiology.
J. D. Walker, R. R. Colwell, Z. Vaituzis, and S. Meyer.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A016 507, Price codes: A02 in paper copy, A01 in microfiche. Nature, Vol. 254, No. 5499 (1976), p 423-424, 2 tab., 3 fig., 9 ref.

Descriptors: Oil, Oil pollution, Oily waters, *Marine algae, *Chesapeake Bay, Marine, Soil algae, Plant physiology, Gas chromatography, *Pollutant identification.
Identifiers: *Petroleum degrading algae, *Prototheca zopfi.

An unusual organism, believed to be an algae, has the ability to degrade petroleum hydrocarbons. The organism is identified as Prototheca zopfi. (Katz)
W77-04062

MICROBIOLOGICAL AND CHEMICAL STUDY OF WATER IN THE BAIA DE ARIES MINE, (IN ROMANIAN),
Societatea de Stiinte Biologice din R.S.R., Bucharest.
I. Lazar, E. Grou, L. Dumitru, and F. Popea.
Stud Cercet Biol 26(3), p 197-203, 1974.

Descriptors: Microbiology, Bacteria, Sulfur, Iron, Mines, Thiobacillus ferroxidans, Spectrometry, Pollutant identification.
Identifiers: Baia-de-Aries mine(Romania), *Romania, Sulfuric-acid.

Research conducted at the Baia de Aries (Romania) mine in the course of the last 2 yr made it possible to conclude that chemoautotrophic bacteria of the Thiobacillus genus, which oxidate the reduced compounds of S and Fe, are very widespread in the water samples gathered from various levels in the mine. It was demonstrated through chemical and microbiological analyses that, during the passage of water through the deposit rock (consisting principally in sulfides), some processes take place which determine the formation of important quantities of sulfuric acid and Fe salts as a result of the activity of Thiobacillus type bacteria. The biological activity is gradually increased towards the lower levels, reaching a maximum at level O.--Copyright 1976, Biological Abstracts, Inc.
W77-04077

ODOROUS COMPOUNDS IN RAW WATER OF WATER SUPPLIES: IDENTIFICATION OF CAMPHOR AND P-METHYLACETOPHENONE, (IN JAPANESE),
Toyama Univ. (Japan). Research Inst. for Wakanyaku.
T. Kikuchi, T. Mimura, Y. Kawashima, Y. Moriwaki, and Y. Masada.
Yakugaku Zasshi 95(12), p 1517-1519, 1975.

Descriptors: *Odors, Chromatography, *Gas chromatography, *Mass spectrometry, *Pollutant identification, Lakes, Organic compounds, Water pollution.
Identifiers: Acetophenone, *Camphor, *Japan, Lake Inbanuma(Japan).

By gas chromatography and gas chromatography-mass spectrometry, camphor was detected from the water of Lake Inbanuma, a Chiba Prefecture (Japan) water supply source, and camphor and p-methylacetophenone were detected from the water supply source. These compounds are partly responsible for the objectionable odor and taste of the water.--Copyright 1976, Biological Abstracts, Inc.
W77-04078

TRACE ELEMENT CONTENT IN THE BOTTOM SEDIMENTS AND WATER OF THE RIVERS PRZEMSZA AND VISTULA IN THE SECTION OF ITS MOST INTENSE POLLUTION, (IN POLISH),
Polish Academy of Sciences, Krakow. Zaklad Biologii Wod.
K. Pasternak, R. Truski, and S. Baran.
Ochr Prazyr 40, p 351-360, 1975.

Descriptors: *Trace elements, *Bottom sediments, Water pollution, Cadmium, Copper, Chromium, Lead, Rivers, Spectrophotometry, Zinc, *Pollutant identification, Manganese.
Identifiers: Vistula River(Poland), Przemsza River(Poland), *Atomic absorption spectrometry, *Poland.

Levels of trace elements were determined in the sediments and waters of the Przemsza and Upper Vistula rivers in the area of strongest pollution (Oswiecim-Krakow-Nowa Huta, Poland) and in the area (Grabie-Polaniec) where more intense self-purification of the water and its strong dilution by relatively clean waters occur. The microelements in the water were determined using atomic absorption spectrophotometry and in the sediments using emissmion spectromety. Other physico-chemical properties of the sediments were determined. The amounts of most microelements in sandy sediments many times exceeded the amounts in the sedximents of polluted aquatic environments and land soils. In the area of the strongest pollution the water of the Przemsza and Vistula rivers contained many times more microelements than the water of clean rivers. In the strongly polluted water of the Przemsza and Vistula particularly great amounts of Zn, Cu, Cd and Mn were found. In the investigated sediments great concentrations of Zn, Cu, Pb and Cr were recorded. In the sediments of the Vistula a high content of microelements is maintained with very little fluctuation in a 95-km sector, indicating many points of pollution inflow. The quantitative level of microcomponents in the sediments depends on the degree of mineral pollution of the river. In the investigated polluted rivers there was no definite relation between the amount of microcomponents in the sediments and the content of organic matter and, in many cases, also of clayey fractions in them. In the sectors of the River Vistula raised by mill-dams and sluices the sediments were richer in microelements than the sediments of its normal river-bed. The microelements cumulate in the sediments in the form of settled suspension, and partly in the form of ions absorbed on the water surface. The quantitative level of some microelements in the sediments of the Przemsza and Tistula is also influenced by the amount of the admixture and hard coal dust particles which constitute a large percentage of water suspensions. In the in-

vestigated sector of the River Vistula the silts deposited with floods constitute the source of heavy metal pollution of soil. During floods land biotopes and aquatic environments are subject to contamination with heavy metals.--Copyright 1976, Biological Abstracts, Inc.
W77-04079

USE OF NEW TYPE OF MEMBRANE FILTERS IN ISOLATING SALMONELLA FROM WATER OF SURFACE RESERVOIRS, (IN RUSSIAN),
Nauchno-Issledovatelskii Institut Gigieny, Moscow (USSR).
E. K. Gipp, V. V. Tabunshchikov, V. I. Vakhrushev, O. I. Nachinkin, and E. Rubak.
Gig Sanit 2, p 86-87, 1976.

Descriptors: *Filters, Reservoirs, *Salmonella, Isolation, *Pollutant identification.
Identifiers: *Membrane filters.

Phenylone membrane filters with pores of 0.3, 0.5 and 1 micro-m were tested under natural and laboratory conditions. Due to their high filtration rate and concentrating ability, filtres with 1 micro-m pores are recommended as preliminary filters; the others can be used in Salmonella determination. The filters withstood sterilization by boiling without deforming or curling.--Copyright 1976, Biological Abstracts, Inc.
W77-04082

SOME PROBLEMS OF SANITARY MICROBIOLOGY, (IN RUSSIAN),
G. G. Mirzoev.
Gig Sanit 8, p 107-109, 1975.

Descriptors: *Microbiology, *Microorganisms, Public health, Dairy industry, Farm wastes, *Bioindicators, Methodology, *Pollutant identification.
Identifiers: Colibacillus, *Microbes.

The microbe number, the total number of microbes in 1 g or 1 ml, is a common microbiological method of evaluating water, milk and other products for their sanitary status in combination with colibacillus titer determination. Since microorganisms continue to multiply in milk, dairy and other products, a determination of the microbe number as an index of their sanitary evaluation has no practical value.--Copyright 1976, Biological Abstracts, Inc.
W77-04085

VARIATIONS IN CD, PB AND CU CONTENT OF WATERS OF THE LOWER ESTUARY OF THE SAINT LAWRENCE DURING THE SUMMER OF 1972, (IN FRENCH),
Quebec Univ., Rimouski. Dept. of Oceanography; and Quebec Univ., Rimouski. Dept. of Pure Sciences.
M. Arnac.
Mar Chem 4(2), p 175-187, 1976.

Descriptors: *Cadmium, *Lead, *Copper, Estuaries, Summer, Spectrophotometry, *Pollutant identification, *St Lawrence seaway, *Canada, Primary productivity, Water pollution effects.
Identifiers: Atomic absorption spectrophotometry.

Concentrations of Cd, Pb and Cu were determined in the lower estuary of the St. Lawrence River (Canada) during the summer of 1972 (from May-Aug). Seven sample stations distributed in the estuary were studied. Analysis measurements were made using atomic absorption spectrophotometry and are related to the soluble metals. The concentrations of Cd are low and no important variations occur. Mean analysis of Cd abundance gives a value of 1.05 micro-g/l. The Cu/Pb ratio is nearly equal to unity. Average concentrations for all the stations are 3.11microns/l for Cu and 3.48 micro-g/l for Pb. Higher values are measured for Cu and Pb during May and these are related to the freshwater inflow arising from the thawing period. The lowest concentrations are observed during June and July and are in correspondence with the spring period of intense primary production. The biologic-dynamic conditions affecting the concentrations of Cd seem to be different from those affecting Cu or Pb contents (without considering pollution phenomena). The highest average values for Cu and Pb were found on the S shore of the estuary. The values obtained in this work compared favorably with other results gathered in the neighboring area.--Copyright 1976, Biological Abstracts, Inc.
W77-04086

MICROCALORIMETRIC INVESTIGATIONS IN POLLUTED SURFACE WATERS, (IN GERMAN),
Innsbruck Univ. (Austria). Inst. of Hygiene and Microbiology.
F. Tiefenbrunner.
Zentralbl Bakteriol Parasitenkd Infektionskr Hyg Erste Abt Orig Reihe B Hyg Praev Med 161(5/6), p 519-526, 1976.

Descriptors: *Bacteria, Microorganisms, *Calorimetry, *Pollutant identification, Oxidation, Water pollution control, Microbiology, Trickling filters.

Hygienic control of polluted surface waters must be correlated with measurements of decomposition rate of heterotrophic microbial populations. Since 1970 different methods were tested for this purpose. Uptake kinetic studies of radioactive labeled substrates and automated BOD (biochemical O2 demand) registrations cannot be handled as flow systems. Flow-microcalorimetry (heat conduction principle) is an easier approach to test the activity of heterotrophic aquatic populations. Probes from a trickling-filter outflow from an oxidation pond and from a small river were tested simultaneously in a flow-microcalorimeter and a drop-microcalorimeter after adding 200 microgram/l glucose. The resulting voltage/timecurves show a good correlation to the heterotrophic capacity of the probes. The minimal detectable continuous heat effect was 1 micro W corresponding to a (relative) activity of 5.6 . 10 to the fourth power bacterial colonies/ml on Difco agar (counts after 48 h incubation at 22 micro C). A modification of the flow-microcalorimeter using a 5-10 times larger reaction vessel enabled the system to be used in testing scarcely polluted surface waters and for toxicity tests of surface water samples.--Copyright 1976, Biological Abstracts, Inc.
W77-04091

THE DETECTION OF AEROMONADS OF THE HYDROPHILA-PUNCTATA-GROUP, IN THE HYGIENIC ANALYSIS OF DRINKING WATER, (IN GERMAN),
Frankfurt Univ. (West Germany). Hygiene-Institut.
R. Schubert.
Zentralbl Bakteriol Parasitenkd Infektionskr Hyg Erste Abt Orig Reihe B Hyg Praev Med 161(5/6), p 482-497, 1976.

Descriptors: *Potable water, *Water analysis, *Public health, *Bacteria, Coliforms, *Pollutant identification, Sewage, E. coli, Water pollution.
Identifiers: *Aeromonads, Aeromonas-hydrophila, *Aeromonas-punctata.

A retrospective analysis was done of bacteriological water examinations of single wells within which E. coli, coliform and colony count determinations were performed in a 1 yr examination period, and the water samples were examined for Aeromonas of the hydrophila-punctate-group (A. hydrophila, A. punctata). The single wells were divided into 5 groups because of pre-testing and reexamination results and because of the local circumstances. The relation of aerogenic t
anaerogenic aeromonads in wells close to th
shore in the direction of infiltration was examine
Flat wells without influence of surface water i
groundwater areas with relatively porous surfac
layer were studied. While in river water loade
with sewage the anaerogenic aeromona
dominate the population up to about 80%, the
proportion diminishes in the shore filtrate so th
within a certain distance, in groundwater filtere
through the shore, only aerogenic aeromonads a
found. From water of flat wells with relative
porous surface layer exclusively aerogen
aeromonads colonies were isolated. Because th
aerogenic aeromonads were not found in dee
wells but were found more or less frequently
flat wells the proof of anaerogenic Aeromon
demonstrates surface water sewage pollution.
W77-04092

5B. Sources Of Pollution

**THE EFFECT OF THE CENTRAL ARIZON
PROJECT ON THE THERMAL STRUCTUR
OF LAKE HAVASU,**
Arizona Univ., Tucson. Dept. of Hydrology a
Water Resources.
For primary bibliographic entry see Field 2H.
W77-03624

**LOSSES OF DIURON, LINURON, FENAC, AN
TRIFLURALIN IN SURFACE DRAINAG
WATER,**
Agricultural Research Service, Baton Rouge, La
For primary bibliographic entry see Field 5G.
W77-03639

**PROCEEDINGS OF THE INTERNATIONA
CONFERENCE ON TRANSPORT OF PE
SISTENT CHEMICALS IN AQUAT
ECOSYSTEMS.**
National Research Council of Canda, Otta
(Ontario).
Available from Executiv Sec. Inter
tion/Conference on Transport of Persiste
Chemicals in Aquatic Ecosystems, Natio
Research Council of Canada, Ottawa, Cana
$8.00. Published by National Research Council
Canada, Ottawa, Canada. Editorial Revi
Board:de Freitas, A. S. W., Kushner, D. J., a
Qadri, S. U., 334 p.

Descriptors: *Conferences, *Publications, Se
ment transport, Water pollution, Pollutants, D
tribution, Mercury, Chlorinated hydrocarbo
Pesticides, Aquatic environment, *Ecosyste
Model studies, Mathematical models, Fo
chains, *Path of pollutants.
Identifiers: Ottawa River Project.

The conference was held under the sponsorship
the National Research Council of Canada in
tawa, Canada on May 1-3, 1974 as part of
design of the Ottawa River Project. T
proceedings includes 46 papers which w
presented at the conference as well as an aut
index and a list of participants. The proceedi
are divided into four sections which deal wi
water and sediment transport and pollution
tribution, physical and biological exchan
between aquatic ecosystem compartments, fo
chain transport of pollutants, and ecosystem si
lation and mathematical modelling. (See W
03643 thru W77-03683) (Chilton-ORNL)
W77-03642

**THE DISTRIBUTION AND TRANSPORT
MERCURY IN THE SEDIMENTS OF THE LA
RENTIAN GREAT LAKES SYSTEM,**
Canada Centre for Inland Waters, Burling
(Ontario).
R. L. Thomas.

Proceedings of the International Conference
Transport of Persistent Chemicals in Aquatic
ystems held in Ottawa, Canada May 1-3,
. p I-1 -I-16, 17 fig, 2 tab, 18 ref.

riptors: *Sedimentation, *Sediment trans-
*Mercury, *Great Lakes, *Sediment dis-
tion, Deposition(Sediments), Chemicals,
h of pollutants, Water pollution.

' samples of the uppermost 3 cms of sediment
the Great Lakes (excluding Lake Michigan)
analyzed for total mercury. Concentrations
d from 4 to 9500 ppb with a mean of 347 ppb.
r conclusions of the study were that Lakes
rior and Michigan as head waters of the
m had low mercury levels with no throughput
ake Huron. Lake Superior showed localized
of mercury enrichment. Lake Huron showed
rally low levels of mercury with local areas of
r concentration, reflecting localized inputs
mineralization, occurring in Georgian Bay.
hern Lake Huron appeared to be receiving
from Saginaw Bay and transmitting the bulk
is to Lake St. Clair. Mercury distribution in
St. Clair suggests that much of the input car-
straight throught to the Detroit River and to
Erie. The sediment bound mercury in Lake
moves relative to lake circulation to a final
in the eastern basin of the lake. Mercury in
Ontario is derived predominantly from
es in the Niagara River. Distribution reflects
hysical circulation with deposition occurring
e main basins of the lake. (See also W77-
2) (Chilton-ORNL)
03643

NSVERSE DISPERSION IN MEANDERING
NNELS,
da Centre for Inland Waters, Burlington
rio).
rimary bibliographic entry see Field 2E.
03644

DISTRIBUTION AND TRANSPORT OF
SEDIMENTS AND PERSISTENT POLLU-
TS IN THE OTTAWA RIVER, CANADA,
va Univ. (Ontario). Dept. of Geology.
Rust, and D. G. Waslenchuk.
roceedings of the International Conference
ransport of Persistent Chemicals in Aquatic
ystems held in Ottawa, Canada May 1-3,
p I-25-I-40, 12 fig, 2 tab, 29 ref.

riptors: *Sedimentation, *Water pollution,
tants, Heavy metals, Mercury, Sediment
port, Sediment distribution Deposi-
Sediments), Chemicals, *Path of pollutants,
da.
ifiers: Chemical desorption, *Ottawa
(Canada).

nineralogy of bed sediments in a three-mile
of the Ottawa River was studied. Mean grain
vas closely related to water depth and flow
ity. The best overall correlation was that
en iron and grain size. Finer sediments, hav-
higher relative surface area, showed a higher
ntration of iron and this appeared to control
anese and mercury concentrations. Heavy
concentrations also appeared to correlate
wood chip content because of their high
ity and relative surface area. Mercury levels
d sediment appeared to be decreasing by
50% per year. The loss is achieved by
anical transport of detrital grains with ad-
d mercury and by chemical desorption. (See
V77-03642) (Chilton-ORNL)
03645

ROLE OF FLOCCULATION IN THE
SPORT OF PARTICULATE POLLU-
'S IN THE MARINE ENVIRONMENT,
rd Inst., of Oceanography, Dartmouth
Scotia). Atlantic Oceanographic Lab.
anck.

In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p I-41-I-46, 6 fig, 15 ref.

Descriptors: *Sedimentation, *Water pollution, *Sediment transport, Aquatic environment, Pollutants, Flocculation, Particle size, Settling velocity, *Path of pollutants.

Fine-grained particulate pollutants introduced into the marine environment do not retain their original distinct grain size but flocculate into larger particles. The size distribution of the effluent is dependent on the size distribution of the natural sediment distribution. Transport behavior and sedimentation pattern of natural suspended sediment may be used as a guide to the dispersal of particulate pollutants in a marine area. Water transport and flushing rate is not a reliable indication of th dispersal of particulate pollutants because particles tend to flocculate into larger units with sufficiently high settling rates to give them a different net speed and direction from that of the water in which they are suspended. (See also W77-03642) (Chilton-ORNL)
W77-03646

MERCURY TRANSPORT BY BED SEDIMENT MOVEMENTS,
Ottawa Univ. (Ontario). Dept. of Civil Engineering.
D. R. Townsend, A. Kudo, H. Sayeed, and D. R. Miller.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p I-47-I-51, 6 fig, 3 ref.

Descriptors: *Sedimentation, *Water pollution, *Sediment transport, *Mercury, Particle size, Sorption, Clays, Sands, *Path of pollutants, Canada.
Identifiers: Organic sediments, Ottawa River(Canada).

The sediment samples collected for use in the study were composed of three basic materials: sands, clays, and organics(wood chips). Fine to coarse sands constituted the predominant sedimentary material in the main channel of the Ottawa River but wood chips mixed with very fine sand and clay fractions were predominant in specific locations. Wood fibre matrix had a higher sorption capacity for mercury than did sands and the sorption capacity was also found to vary with particles size. Particles ranging in size from 0.45 to 38 microns had approximately 99 times higher sorption capacity than that of sand particles ranging from 100 to 150 microns. Laboratory tests made use of a 2-dimensional pressurized flume to assess critical values of flow parameters at which movement of particles takes place. (See also W77-03642) (Chilton-ORNL)
W77-03647

PHYSICAL EXCHANGE IN STREAM ECOLOGY STUDIES,
Ottawa Univ. (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W77-03648

GEOCHEMICAL INTERACTION IN THE RECENTLY INDUSTRIALIZED STRAIT OF CANSO,
Bedford Inst., Dartmouth (Nova Scotia). Atlantic Geoscience Center; and Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Environmental Marine Geology.
R. R. Cranston.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p I-59-I-67, 4 tab, 6 fig, 14 ref.

Descriptors: *Geochemistry, Environment, Biology, Sedimentation, Deposition(Sediment), Pulp and paper industry, Wood wastes, Pulp wastes, Geology, Chemistry, Environmental effects, Distribution, Sediment transport, Industrial wastes, Canada.
Identifiers: *Strait of Canso(Canada).

Biological physical, geological, and chemical parameters were measured at over 200 locations in the Strait of Canso in 1973. It was concluded that the effluent from a pulp mill was primarily responsible for controlling the distribution of chemical and biological parameters. Less than 1% of the total dissolved metal and particulate organic matter in the effluent has been retained by the bottom sediments over the past 10 years. Data from analysis of bottom sediments indicated that the silicious matrix of the sediments is diluted by large concentrations of wood pulp fibre. Anomalous concentrations of metal are found in the organic rich sediments close to the discharge pipe. The strongest negative correlation in the data was found between zinc and benthic foraminifera populations. (See also W77-03642) (Chilton-ORNL)
W77-03649

HEAVY METAL CONCENTRATIONS AND DISTRIBUTIONS IN RIVER MOUTH SEDIMENTS AROUND THE GREAT LAKES,
Toronto Univ. (Ontario). Dept. of Botany; and Toronto Univ. (Ontario). Inst. for Environmental Studies and Engineering.
T. C. Hutchinson, and J. Fitchko.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p I-69-I-77, 3 tab, 2 fig, 17 ref.

Descriptors: Sedimentation, *Heavy metals, *Sediment distribution, *Sediment transport, Fluvial sediments, *Great Lakes, Mercury, Lead, Cadmium, Zinc, Copper, Nickel, Cobalt, Manganese, Chromium, Silver, Cores, *Path of pollutants, Water pollution.

Surface and core samples of sediments were analyzed by atomic absorption spectrophotometry for the metals Hg, Pb, Cd, Zn, Cu, Ni, Co, Mn, Cr, and Ag to make a general comparison of the relative degree of heavy metal acculation in sediments between the Great Lakes. It was concluded that there was a greater input of a least seven of the ten metals into the Lower Great Lakes. The greatest difference in input occurred for cadmium, chromium, and mercury and the smallest differences between lakes for nickel, cobalt, and manganese. Most of the core samples indicated no surface accumulation of heavy metals. Homogeneous concentrations throuhout the core indicated resuspension, homogenation, and redeposition of sediments by dredging, shipping activity, and current action. Significant correlations were found between the concentrations of several heavy metals and the loss on ignition (organic matter) data and with the clay fraction of the sediment. (See also W77-03642) (Chilton-ORNL)
W77-03650

HEAVY METAL POLLUTANTS IN THE SEDIMENTS OF THE RHONE RIVER,
Geneva Univ. (Switzerland). Dept. of Earth Sciences.
J. P. Vernet, and L. M. Johnston.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p I-79-I-81, 3 fig, 2 tab, 3 ref.

Descriptors: *Water pollution, Sedimentation, *Heavy metals, Sediment distribution, Mercury, Nickel, Copper, Zinc, Lead, Sediment transport, *Path of pollutants, Pollutant identification.
Identifiers: *Rhone River(Switz), *Switzerland.

Approximately 100 samples of Rhone River sediments were analyzed for Hg, Pb, Cr, Cd, Co, Sn, V, Ni, Zn, and Cu. Data from these and previous analyses showed that mercury is the primary trace metal contaminant in the system. Nickel may be considered as a natural pollutant in the upper reaches of the Rhone but sources of man-made pollution are evident in the area near Lake Geneva. Copper, zinc and lead showed localized elevated levels which in most cases may be attributed to specific sources. Pollution in the individual canal systems was found to be extensive but (except for mercury, nickel, copper, zinc, and lead) carryover into the main river system is negligible. (See also W77-03642) (Chilton-ORNL)
W77-03651

TRACE METAL POLLUTION FROM A METROPOLITAN AREA: SOURCES AND ACCUMULATION IN THE LOWER FRASER RIVER AND ESTUARY,
British Columbia Univ., Vancouver. Westwater Research Centre.
K. J. Hall, and K. Fletcher.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974, p I-83-I-87, 2 fig, 3 tab, 7 ref.

Descriptors: Environmental effects, *Water pollution effects, Pollutants, Water quality, Heavy metals, Sediments, Toxicity, Fish, Sedimentation, Canada, *Path of pollutants.
Identifiers: Lower Fraser River(BC), *Fraser River(BC).

Water quality problems in the lower Fraser River were found to be due to the presence of pathogenic microorganisms and to potential toxicity problems as a result of some high trace metal levels in the reaches of the river influenced by urban-industrial development. The highest trace metal concentrations were measured in waters influenced by metropolitan Vancouver. Surface sediments showed an apparent increase in trace metals in the Fraser estuary with a sewage treatment plant implicated as one of the major sources. Although most trace metal concentrations that were measured do not appear to be acutely toxic to fish, with the sporadic nature of their discharge some potentially dangerous levels could occur. (See also W77-03642) (Chilton-ORNL)
W77-03652

TRANSPORT OF SOME ORGANOCHLORINES IN B. C. WATERS,
Simon Fraser Univ., Burnaby (British Columbia). Dept. of Biological Sciences.
P. C. Oloffs, and L. J. Albright.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p I-89-I-92, 3 fig, 3 tab, 6 ref.

Descriptors: *Water pollution, *Organic compounds, Pesticides, *Organic pesticides, DDT, Polychlorinated biphenyls, Sediments, Sediment transport, Air-water interfaces, *Path of pollutants.
Identifiers: *Organochlorines, *Lindane, *Chlordane.

Results of laboratory studies carried out with DDT, lindane, chlordane and a PCB indicated that bottom sediments can not only prevent escape of residues from natural waters into the atmosphere, they can also prompt movement from water downwards into sediments. Depth and water flow (agitation) are important factors in this process. Residues found in a shallow, microbiologically active water body may partition into bottom sediment and be metabolized. Residues in a deep and undisturbed lake may well move into the atmosphere while residues originating from sewage outfalls could remain suspended in the water and with it move into an open marine environment. (See also W77-03642) (Chilton-ORNL)
W77-03653

HEAVY METALS IN THE LOWER MISSISSIPPI,
Michigan Univ., Ann Arbor. Dept. of Environmental and Industrial Health.
R. Hartung.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p I-93-I-98, 12 tab, 10 ref.

Descriptors: *Water pollution, *Heavy metals, Water, Sediments, Aquatic life, Fish, Shrimp, Cadmium, Chromium, Lead, Manganese, Mercury, Arsenic, *Mississippi River, Path of pollutants.

Samples of fish and shrimp, sediments, and water from the lower 280 miles and the delta of the Mississippi were analyzed for cadmium, chromium, lead, manganese, mercury and arsenic. The concentration of each of the elements in filtered water was near the lower limit of detection. Sediments showed the greatest concentrations (Arsenic, 7.82 ppm; Cadmium, 0.332 ppm; Chromium, 9.33 ppm; Lead, 13.8 ppm; Manganese, 599. ppm; and Mercury, 0.329 ppm). The biological availability of the metals appeared to be low with no significant differences in the body burdens between predators and bottom feeders. (See also W77-03642) (Chilton-ORNL)
W77-03654

SUSPENDED SOLIDS AND VELOCITY DISTRIBUTIONS IN THE OTTAWA RIVER,
Ottawa Univ. (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W77-03655

ADSORPTION ISOTHERMS FOR THE UPTAKE OF ZINC BY CLAY MINERALS IN A FRESHWATER MEDIUM,
Washington State Univ., Pullman. Nuclear Radiation Center.
A. C. M. Bourg, and R. H. Filby.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p II-1-II-5, 4 fig, 2 tab, 5 ref.

Descriptors: *Aquatic environment, *Sediments, *Clays, *Zinc, *Adsorption, Spectrophotpmetry, Ion exchange.
Identifiers: *Adsorption isotherms.

Preliminary results are presented of a study of the uptake of zinc by three clay minerals: illite, montmorillonite, and kaolinite. The experiments were carried out by using a fresh-water model to allow application of the results to natural systems. Constant pH and constant ionic strength were maintained during the experiments. The znc concentrations before and after equilibration with the clays were determined by atomic absorption spectrophotometry. The rapidity of the adsorption reaction suggested an ion-exchange mechanism as opposed to physical adsorption. This conclusion is supported by the known ion-exchange properties of clays in a variety of environments. (See also W77-03642) (Chilton-ORNL)
W77-03656

SULPHIDE MEASUREMENT USING AMMONIUM MOLYBDATE,
Ontario Ministry of the Environment, Toronto. Sediment and Biomaterials Lab.
For primary bibliographic entry see Field 5A.
W77-03657

ADSORPTION OF C14-DDT TO PARTICLE SURFACES,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Marine Ecology Lab.
B. T. Hargrave, and G. A. Phillips.
In: Proceedings of the International Confere on Transport of Persistent Chemicals in Aqu Ecosystems held in Ottawa, Canada May 1974. p II-13-II-18, 3 fig, 20 ref.

Descriptors: *Chemical properties, *Adsorpt *DDT, *Pesticides, Sediments, Particle size, bon, Aqueous solutions, Water pollution, P tant identification.

Equilibrium concentrations of DDT observe particulate matter are the net result of adsorp desorption and metabolism by micro-organi Preliminary experiments under both static and fusion conditions indicated that little DDT sorbed on silt and sand particles is remove rinsing. It was concluded that adsorption of DDT from seawater by particles ranging in from bacterial cells to large sand grains is inv ly related to mean particle diameter and dir related to concentration providing that satur levels are not exceeded. (See also W77-03 (Chilton-ORNL)
W77-03658

PARTITIONING AND UPTAKE OF PE CIDES IN BIOLOGICAL SYSTEMS,
Dow Chemical U. S. A., Midland, Mich.
For primary bibliographic entry see Field 5C.
W77-03659

WATER-SEDIMENT DISTRIBUTION CHLORINATED HYDROCARBON PESTICI IN VARIOUS ENVIRONMENTAL CO TIONS,
Missouri Univ., Rolla. Dept. of Civil Engineer
J. C. Huang.
In: Proceedings of the International Confer on Transport of Persistent Chemicals in Aq Ecosystems held in Ottawa, Canada May 1974. p II-23-II-30, 9 fig, 1 tab, 4 ref.

Descriptors: Environmental effects, *Pestic Distribution, Water pollution, Sediment, *I *Dieldrin, *Heptachlor, Chlorinated hydroca pesticides, Chemical reactions, *Path of p tants.

DDT, dieldrin, and heptachlor distributio aquatic systems containing clay minerals a humic acids were studied with emphasis plac adsorption rate, mechanisms, and equilibrium tribution. The data indicated that the equilib distribution of pesticides is mainly depe upon the type of pesticide and the character of sediment material. The effect of environm factors, such as pH, temperature, salinity, a ganic pollution in water body, is only of mino nificance. In general, chlorinated hydroca pesticides were extremely hydrophobic in m and easily adsorbed by sediment materials. adsorption mechanism primarily involved s forces of chemical interaction. (See also 03642) (Chilton-ORNL)
W77-03660

CHLORINATED HYDROCARBONS COASTAL MARINE ECOSYSTEMS,
Washington Univ., Seattle. Dept. of Ocea raphy.
For primary bibliographic entry see Field 5C.
W77-03661

DYNAMICS OF INTERACTION OF CAT AND FULVIC ACID,
Carleton Univ., Ottawa (Ontario). Dept Chemistry.
For primary bibliographic entry see Field 2K.
W77-03662

ROANALYSE DE L'INCORPORATION METAL LOURD DANS LES ECAILLES POISSON,
ut National de la Recherche Scientifique, uski (Quebec).
rimary bibliographic entry see Field 5A.
03663

AMICS OF MICROBIALLY PRODUCED IC MATERIAL IN AQUATIC ENVIRON-TS RELATIVE TO DIFFERENT CONDI-S OF TEMPERATURE AND PH,
ut National de la Recherche Scientifique, uski (Quebec).
rimary bibliographic entry see Field 5C.
03664

AMIQUE DE DEGRADATION DU PHENOL LE FLEUVE SAINT-LAURENT,
ut National de la Recherche Scientifique, uski (Quebec).
ulalian, F. Bessou, A. Tessier, P. G.
bell, and S. A. Visser.
roceedings of the International Conference ansport of Persistent Chemicals in Aquatic stems held in Ottawa, Canada May 1-3, p II-53-II-58, 5 fig, 20 ref.

iptors: Environmental effects, egradation, *Phenols, Kinetics, *St ence River, Canada, *Path of pollutants, In-al wastes, Oil wastes.
fiers: Montreal(Canada).

tudy shows that the concentration of phenol-stances from the waste outlets of Montreal refineries diminishes rather rapidly stream from the source of pollution. The c model of the Michaelis-Menten equation is d to experimental results to demonstrate the cs of biodegradation of phenol. (See also 03642) (Chilton-ORNL)
03665

ROBIAL DEALINGS WITH HEAVY ALS,
a Univ., (Ontario). Dept. of Biology.
rimary bibliographic entry see Field 5C.
03666

CURY AND MERCURIAL RESISTANCE RMINED BY PLASMIDS IN ERICHIA COLI AND PSEUDOMONAS GINOSA,
ington Univ., St. Louis, Mo. Dept. of Biolo-

rimary bibliographic entry see Field 5C.
03667

ROLE OF TIN IN BACTERIAL HYLATION OF MERCURY,
and Univ., College Park. Dept. of Chemis-

ey, F. E. Brinckman, S. Grim, and W. P.
n.
roceedings of the International Conference ansport of Persistent Chemicals in Aquatic stems held in Ottawa, Canada May 1-3, p II-73-II-78, 5 fig, 18 ref.

iptors: *Water pollution, *Path of pollutants, ria, *Tin, Mercury, Water pollution sources, istry, Pseudomonas, *Chesapeake Bay,

fiers: *Mercury methylation.

as reported as a frequent co-contaminant ercury in river sediments as well as in water where it was found in much higher concen-s and in a direct proportion to mercury. h of a tin- and mercury-tolerant strain of omonas from the Chesapeake Bay in the ce of both Hg(II) and Sn(IV) results in the formation of methylmercury. Although this methylation of mercury does occur, all the parameters for reproducibility have not been established. A postulated mechanism to account for the formation is that Sn(IV) produces methyltin species by a biological pathway and this methyltin species with Hg(II) produces methylmercury by an abiotic pathway. (See also W77-03642) (Chilton-ORNL)
W77-03668

TRANSPORT AND DISTRIBUTION OF MERCURY IN SEDIMENTS,
Battelle Columbus Labs., Ohio.
R. S. Reimers, P. A. Krenkel, and A. J. Englande, Jr.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p II-79-II-92, 6 fig, 9 tab, 48 ref.

Descriptors: Environmental effects, Water pollution, Pollutants, *Mercury, *Sediments distribution, Transfer, *Path of pollutants, *Sediment transport.

The distribution and transport of mercury in sediment is dependent on the specific properties of the natural water, the native biota, and the specific constituents of the sediment. Identification was made of the general mechanisms causing the transfer of mercury to and from the sediment to other sinks in the aquatic environment (biota, air, and water). Mercury adsorbed in sediment can be solubilized and transported to the biota by the natural solubility of mercury, its ability to complex, alterations in the dissolved oxygen, and variations in the sediment pH's. It was concluded that observed low mercury concentration in natural waters are due to sorption of mercury by biotic and abiotic sediment, precipitation and coagulation of mercury, and the high volatility of mercury and its compounds. (See also W77-03642) (Chilton-ORNL)
W77-03669

BACTERIAL MOBILIZATION OF MERCURY IN CHESAPEAKE BAY,
Maryland Univ., College Park. Dept. of Microbiology.
For primary bibliographic entry see Field 5C.
W77-03670

INTERACTION BETWEEN AQUATIC PLANTS AND RIVER BED SEDIMENTS IN THE UPTAKE OF MERCURY FROM FLOWING WATER,
National Research Council of Canada, Ottawa(Ontario). Div. of Biological Sciences.
For primary bibliographic entry see Field 5C.
W77-03671

LEAD TRANSPORT IN A RIVER ECOSYSTEM,
Illinois Univ. at Urbana-Champain. Dept. of Civil Engineering.
H. V. Leland, and J. M. McNurney.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974, p III-17-III-23, 4 fig, 3 tab, 9 ref.

Descriptors: Environmental effects, Water pollution, *Water pollution sources, *Lead, Sediments, Particle size, Aquatic animals, Periphyton, Rivers, Ecosystems, *Illinois.
Identifiers: *Vermilion River(ILL).

Daily determination of filterable and particulate lead in waters at five locations in the Saline Branch of the Vermilion River were made from February 1972 to July 1974. Results showed that coarse suspended matter is the principal means by which lead is exported from the area. Lead concentrations of bed sediments varied with compositional and textural characteristics of the sediments and with location in the stream. Mainstream sediments exposed to urban runoff and the wastewater treatment plant effluent were significantly higher in lead content than sediments of the rural drainage. Lead accumulations in periphyton were dependent upon the community composition and proximity of pollution sources. Lead concentrations were generally highest in burrowing animals with non-burrowing detritus feeders and herbivores containing higher concentrations than predators. (See also W77-03642) (Chilton-ORNL)
W77-03672

THE FORM OF MERCURY IN FRESHWATER FISH,
Ontario Ministry of the Environment, Toronto. Inorganic Trace Contaminants Lab.
For primary bibliographic entry see Field 5A.
W77-03673

ORIGIN AND FATE OF MERCURY COMPOUNDS IN FISH,
National Research Council of Canada, Ottawa(Ontario). Div. of Biological Sciences.
A. S. W. De Freitas, S. U. Qadri, and B. E. Case.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p III-31-III-36, 6 tab, 19 ref.

Descriptors: Environmental effects, *Water pollution effects, Organic compounds, *Mercury, Fish, *Path of pollutants, Pollutants, Vectors(Biological), Food chains.

The purpose was to compare water and food as vectors for input of inorganic and organic mercury into fish by measuring uptake, clearance rates, and distribution in the organism following single-pulse dosing with Hg203 labelled mercury compounds. Tissue distribution of both forms of mercury approached a steady state about two months after dosing depending on water temperature and size of fish. Differences in tissue distribution were found between different forms of mercury and between different input vectors. The data suggest that environmentally contaminated fish may obtain most of their body burden of methyl mercury by direct uptake from water rather than through the food chain. (See also W77-03642) (Chilton-ORNL)
W77-03674

THE WAYS OF TRANSPORT OF MERCURY TO FISH,
National Swedish Environment Protection Board, Stockholm. Research Lab.
T. B. Hasselrot, and A. Gothberg.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p III-37-III-47, 13 fig, 4 ref.

Descriptors: Environmental effects, *Water pollution effects, Pollutants, *Mercury, *Path of pollutants, Fish, On-site investigations, Food chains, Industrial wastes.
Identifiers: *Sweden.

Outlets from seed disinfection mills have introduced methyl mercury into waters in Sweden. The quantities of mercury introduced in this way have been very small but have resulted in accumulations of more than 1 mg/kg in the fish flesh. Phenyl mercury, used as a pulp preservative in the cellulose industry, has also brought mercury into the environment. Experiments were conducted with caged fish in these waters and results showed that strong concentrations occur in fish flesh over short periods of time and it seems probable that the most important mercury transport in this case has occurred from fish to fish. In tagged fish with high mercury values, moved from the contaminated lake to unaffected lakes, no clear elimination of the mercury was seen after one year. (See also W77-03642) (Chilton-ORNL)

W77-03675

TIME AND SPACE DEPENDENCE OF POLLUTANT LEVELS IN AQUATIC BIOTA, FIELD STUDIES,
Naturhistoriska Riksmuseet, Stockholm (Sweden).
M. Olsson.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p III-49-III-60, 20 fig, 2 tab, 31 ref.

Descriptors: Environmental effects, *Water pollution effects, Pollutants, *Polychlorinated biphenyls, *Mercury, *DDT, Distribution, Fish, *Pikes, *Path of pollutants, Dispersion.

Dispersion of mercury, DDT, and PCB substances in pike from the Archipelago outside Stockholm were studied. Generally the mercury levels were above the natural background level in the Baltic. Mercury levels decrease when moving from the inner to the outer parts of the archipelago. Levels of PCB's decrease significantly when moving from the inner to the outer parts of the archipelago while no statistical difference between the inner and outer parts of the archipelago were found for the DDT's(DDT, DDE, and DDD). (See also W77-03642) (Chilton-ORNL)
W77-03676

TRENDS OF PCB AND DDT IN FISH AND AQUATIC BIRDS,
Fisheries and Marine Service, St. Andrews (New Brunswick). Biological Station.
V. Zitko.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p III-61-III-64, 2 tab, 17 ref.

Descriptors: Environmental effects, *Water pollution effects, *Chlorinated hydrocarbon pesticides, *Polychlorinated biphenyls, *DDT, Fish, Birds, Gulls, *Herrings.
Identifiers: Cormorant.

The concentration of PCB and DDT and metabolites is presented in herring (Clupea harengus) taken in 1972 and 1973, and in double-crested cormorant (Phalacrocorax auritus) and herring gull (Larus argentatus) eggs collected from 1971 to 1973. Data indicated that PCB concentrations were more or less constant or only slightly increasing while the levels of DDT and metabolites appear to be decreasing. (See also W77-03642) (Chilton-ORNL)
W77-03677

MERCURY EFFECTS ON SWIMMING AND METABOLISM OF TROUT,
Fisheries and Marine Service, Winnipeg (Manitoba).
For primary bibliographic entry see Field 5C.
W77-03678

COMPUTER MODELING,
National Research Council of Canada, Ottawa, (Ontario). Div. of Biological Sciences.
D. R. Miller, and M. Zuker.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p IV-1-IV-9, 4 fig, 8 ref.

Descriptors: Model studies, *Mathematical models, Rivers, Water pollution sources, Pollutants, *Path of pollutants, Transfer, Canada, *Computer models.
Identifiers: Pollutant transport, *Ottawa River(Canada).

The Ottawa River Project is partly characterized by the central position of a large-scale mathematical model of the overall system dynamics. This paper describes various aspects of the model. At present, the simplest model under consideration involves six compartments: water, bed sediment, suspended material, invertebrates, higher plants, and fish. 17 interactions are considered in terms of pollutant transport. In addition to a description of the model and programming techniques, the paper deals with the question of validation, both from the standpoint of reproducing historical data and by the method of sensitivity analysis. (See also W77-03642) (Chilton-ORNL)
W77-03679

ON REALISM AND GENERALITY OF BIO-ACCUMULATION MODELS. TOWARDS A GENERAL METHODOLOGY,
Institute for Water and Air Pollution Research, Stockholm (Sweden).
T. Fagerstrom, and B. Asell.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p IV-11-IV-16, 1 tab, 2 fig, 11 ref.

Descriptors: *Model studies, *Mathematical models, Biochemistry, Water pollution effects, Pollutants, Transfer, *Path of pollutants, *Methodology.
Identifiers: *Bio-accumulation models.

A general methodology is discussed in terms of realism (the degree to which the equations used and the variables employed correspond to the real world phenomena they present) and phenomena is discussed with two examples being given. One example demonstrates how a frequently observed relation between the biological half-life of a trace substance and body weight may be explained from the common weight-dependence of metabolic rate. The other example shows that there is no bilogically found reason for using first-order kinetics in food-chain models. (See also W77-03642)
W77-03680

AQUATIC FOOD CHAIN MODELS FOR ESTIMATING BIOACCUMULATION AND BIODEGRADATION OF XENOBIOTICS,
Fish and Wildlife Service, Columbia, Mo. Fish-Pesticide Research Lab.
For primary bibliographic entry see Field 5C.
W77-03681

MATHEMATICAL MODELING OF ESTUARIAL ECOSYSTEMS,
California Univ., Davis. Dept. of Civil Engineering.
G. T. Orlob.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p IV-27-IV-43, 11 fig, 14 ref.

Descriptors: *Model studies, *Mathematical models, *Aquatic habitats, Estuaries, Hydrodynamics, Hydrologic aspects, Water quality, Biological communities, *Ecosystems, *Estuarine environment, Path of pollutants, *California.
Identifiers: *San Francisco Bay-Delta area(Calif).

A set of models is described which are designed to simulate hydrodynamic, hydrologic, water quality, and biologic behavior of aquatic systems of an estuarine environment. The particular set of models is applied to the San Francisco Bay-Delta area. Convection-diffusion equations describe the transport of substance identified with the water mass. Knowledge of hydrodynamic behavior necessary for the solution of this equation is derived from the prototype or a model. Aquatic ecologic processes are described mathematically through the concept of conservation of mass and energy. A set of such equations form the basic model. The set characterizes the transformations of biomass due to growth, respiration, predation and mortality in the estuarine habitat. A model for long-range simulation and another for dynamic response are described. (See also W77-03642) (Chilton-ORNL)
W77-03682

THE OTTAWA RIVER PROJECT,
National Research Council of Canada, Ottawa (Ontario). Div. of Biological Sciences.
D. R. Miller.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p IV-45-IV-49, 2 tab, 2 fig, 5 ref.

Descriptors: Environmental effects, *Water pollution effects, *Model studies, *Mathematical models, Projects, Project purposes, *Mercury, Chlorinated hydrocarbons, Distribution, Rivers, *Canada, *Path of pollutants.
Identifiers: *Ottawa River Project(Canada).

The Ottawa River Project is a joint study by the National Research Council Laboratories and the University of Ottawa. The study gives emphasis to the role of mathematical modeling in the project and the interaction between modelling and allocation of research effort. From the standpoint of the entire project the following conclusions have been made: the distribution of mercury in the test section is almost entirely in the non-biological parts, particularly the sediment, and to a lesser extent the water. Although only a small fraction of the total pollutant burden is present in biological materials, these are of greatest interest to human users, and a precisely calibrated predictive model must be produced covering all of the biological compartments as well as the physical. (See also W77-03642) (Chilton-ORNL)
W77-03683

CONTINGENCY PLAN FOR SPILLS OF OIL AND HAZARDOUS MATERIALS FOR INLAND WATERS OF REGION III.
Environmental Protection Agency, Philadelphia, Pa. Region III.
For primary bibliographic entry see Field 5G.
W77-03700

THE COSTS AND EFFECTS OF CHRONIC EXPOSURE TO LOW-LEVEL POLLUTANTS IN THE ENVIRONMENT,
For primary bibliographic entry see Field 6G.
W77-03701

A MATHEMATICAL MODEL FOR WATER QUALITY EVALUATION IN THE SOUTH CAROLINA GRAND STAND,
Clemson Univ., Dept. of Civil Engineering.
S. W. McChesney, and B. L. Edge.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 95. Price codes: A05 in paper copy, A01 in microfiche. South Carolina Water Resources Research Institute, Clemson, Report No. 45, September 1976. 93 p, 19 fig, 10 tab, 25 ref, 1 append. S-034-SC.

Descriptors: *Estuaries, *Water quality, *Stochastic processes, Planning, Water resources, Coliform, *South Carolina, *Mathematical models, Model studies, *Path of pollutants, *Simulation analysis.
Identifiers: *Intracoastal waterway(SC), *Grand Stand(SC).

The purpose was to develop a suitable mathematical model for simulating water quality in the Intracoastal Waterway behind Myrtle Beach, South Carolna. Within this context, the Custer-Krutchkoff estuary model and the FWQA dynamic estuary model were used to provide a stochast

ect to the available deterministic, dynamic dels. The stochastic addition to these models es the user a more complete knowledge of the cts of discharges of pollutants on the water lity of an estuary. Instead of a single specific ıe for a water quality parameter, as would be ained from a deterministic model, the chastic model is able to predict a range of ıes along with their frequency of occurrence. more complete knowledge given by this com- ent makes possible better management deci- ıs. For example, the knowledge of the frequen- of occurrence for a value of pH caused by an lic discharge could be extremely important in blishing regulations for the discharge. Because he harmful effects that even short periods of pH can have, a stochastic simulation of this ameter would yield more useful knowledge n which to base a management decision than ld a deterministic model.
7-03731

RRENTS AND POLLUTANT DISPERSION IN KE MICHIGAN, MODELED WITH EMPHA- ON THE CALUMET REGION,
ois Univ. at Chicago Circle. Dept. of Informa- Engineering.
.. Katz, and G. M. Schwab.
ilable from the National Technical Informa- Service, Springfield, VA 22161 as PB-263 015, e codes: A05 in paper copy, A01 in microfiche. ois Water Resources · Center, Urbana, earch Report No. 111, March 1976, 70 p, 20 fig, b, 70 ref, 2 append. S-035-ILL and S-042-ILL.

criptors: *Computer models, Water circula- , Water pollution sources, *Dispersion, *Lake higan, *Illinois, *Water quality control, Model lies, Lake shores, *Path of pollutants.
ntifiers: *Lake currents, Calumet Harbor Re- (Ill), Chicago area(Ill), *Chicago-Calumet bor shoreline.

s report summarizes several years of Lake higan modeling efforts on the preservation and rovement of nearshore water quality. These ef- s have illuminated some remaining technical blems and suggested ways for modeling highly uted regions like the Chicago-Calumet Harbor reline. An adaptation of the Simons three- ensional current model for Lake Michigan pol- nt-dispersion studies is presented. Typical lts from Lake Michigan are presented to onstrate its excellent capabilities for treating a e range of large-scale phenomena. A rationale eveloped for the use of local episode simula- s as a means of over-coming some difficulties btaining sufficient data for calibration and fication of whole-lake models. Then, an appli- on of a simple model to some observed 'bad- er' episodes is presented. Comparison of ob- ations and model results suggests that the et of some periods of extreme pollution is erned wind-driven transport. Under southerly ds, high pollutant levels are often observed at 68th St. Crib within 20-40 hours following a y rain at Calumet Harbor. The limitations of g a purely hydrodynamic model to treat eactive contaminants are shown, and improve- ts in resolution required in future, more accu- episode models are estimated. A number of clusions are drawn regarding the directions in ch future nearshore research efforts might itably proceed.
7-03732

RAULICS OF SURFACE BUOYANT JET,
nical Univ. of Denmark, Copenhagen. Inst. of rodynamics and Hydraulic Engineering.
primary bibliographic entry see Field 8B.
-03743

SOME REMARKS ON THE MAINTENANCE OF THE SALINITY DISTRIBUTION IN ESTUARIES,
Liverpool Univ. (England). Dept. of Applied Mathematics and Theoretical Physics.
For primary bibliographic entry see Field 2L.
W77-03764

THE EFFECTS OF AGRICULTURAL RUN-OFF AND SILTATION ON A NEW RECREATIONAL LAKE,
Illinois State Univ., Normal. Dept. of Biological Sciences; and Illinois State Univ., Normal. Dept. of Chemistry.
A. C. Sievert, T. A. Nelson, J. M. Fioramonti, D. J. Gillard, and G. L. Hortin.
Transactions of the Illinois Academy of Science, Vol. 68, No. 4, p 369-380, December 1975. 2 fig, 3 tab, 10 ref. NSF GY-11527.

Descriptors: *Lakes, *Surveys, *Water quality, *Illinois, On-site investigations, Data collections, *Agricultural runoff, Recreation, Surface waters, Deposition(Sediments), Reservoirs, Water temperature, Hydrogen ion concentration, Pesticides, DDT, DDE, Aldrin, Dieldrin, Phosphates, Nitrates, Dissolved oxygen, Chlorides, Zooplankton, Bethic fauna, Fish, Carp, Oligochaetes, *Silting, Silts.
Identifiers: *Evergreen Lake(Ill), *Siltation.

Chemical, biological, and physical analyses were performed at four-year-old Evergreen Lake, Illinois, in an effort to determine whether the quality of the lake was being affected by its agricultural setting. All chemical parameters were found to be within permissible levels for public water supplies. Benthos populations were sparse, yet plankton populations indicated a rapidly maturing lake. The fish populations were imbalanced with 75% consisting of Carp and Gizzard Shad. Sedimentation, particularly in the shallow south end, which will lead to loss of volume and creation of mud flats, appeared to be the major problem confronting this lake in the future. (Humphreys - ISWS)
W77-03766

AN ASSESSMENT OF TECHNIQUES FOR HYDROTHERMAL PREDICTION,
Massachusetts Inst. of Tech. Cambridge. Dept. of Civil Engineering.
G. H. Jirka, G. Abraham, and D. R. F. Harleman.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-250 509, Price codes: A18 in paper copy, A01 in microfiche. Report NUREG-0044, March 1976. 417 p, 120 fig, 6 tab, 166 ref, 3 append. NRC AT(11-1)-2374.

Descriptors: *Forecasting, *Hydrothermal studies, *Powerplants, *Cooling water, *Distribution patterns, Thermal powerplants, Electric powerplants, Model studies, Mathematical models, Laboratory tests, Evaluation, Analytical techniques, Thermal pollution, Rivers, Estuaries, Lakes, Discharge(Water), Flow, Temperature, Water temperature, Heated water, Water quality, Hydrology, Hydraulics, *Path of pollutants.
Identifiers: *Waste heat, Cooling ponds, *Hydrothermal prediction.

A critical assessment is provided of techniques - both mathematical models and experimental methods - to predict temperature distribution in the water environment resulting from waste heat releases from steam-electric generation. Such predictions constitute an integral part of environmental impact assessment of powerplant facilities. Different types of receiving waters and discharge modes were discussed. Types of receiving waters include lakes, rivers, estuaries, coastal waters, and cooling ponds; discharge modes were surface and submerged discharges. Mathematical models were evaluated in regard to their physical validity, degree of field or laboratory verification, and computational utility. Predictive techniques were found to be reliable and accurate only if they are applied within limited portions of the temperature field (zone models), and a careful integration is necessary to obtain complete descriptions of the temperature field. This restriction stems from difficulties in representing the variety of heat transport processes in the water environment in a single analytical or experimental technique. Certain models whose limits of applicability have been established were recommended for use in hydrothermal impact assessment. (Sims-ISWS)
W77-03768

SEASONAL AND SHORT-TERM VARIATIONS IN THE CONCENTRATION AND SUPPLY OF DISSOLVED ZINC TO POLLUTED AQUATIC ENVIRONMENTS,
University Coll. of Wales, Aberystwyth. Dept. of Geography; and University Coll. of Wales, Aberystwyth. Dept. of Geology.
D. L. Grimshaw, J. Lewin, and R. Fuge.
Environmental Pollution, Vol. 11, No. 1, p. 1-7, 1976. 2 fig., 2 tab., 15 ref.

Descriptors: *Zinc, *Rivers, *Fluctuations, *Mine wastes, Seasonal, Low flow, Runoff, Water pollution sources, Europe, Sampling, Metals, Waste disposal.
Identifiers: *River Ystwyth(Wales).

Monitored levels of dissolved zinc in the River Ystwyth, Wales, ranging from 0.17 to 0.88 mg/l, were related to discharge variations. Bulking of samples, infrequent sampling, and sampling without regard to the recording of discharges are inadvisable. Concentrations were highest at low flows (a 'dilution' effect), and for brief periods during the initial stages of storm runoff (a 'flushing' effect), but in terms of bulk zinc output the range of discharge variation (0.4 to 269.00 cu m/sec in 1973-1974) far outweighed the effect of varying concentration. An annual yield of 72 tons of dissolved zinc had been estimated for two successive years, with individual monthly yields ranging between 1.0 and 12.8 tons, the higher during winter discharges. This may explain observed variations in metal concentration in coastal waters and in certain biota, in addition to changes arising from varying rates of metabolic activity. The conclusion is that both seasonal and short-term fluctuations may be of varying significance in different biological contents. If peak concentrations are critical, then these appear to occur both at low flows and during the initial phases of storm runoff. The sampling program was conducted some 10 km downstream from a mining activity conducted a half-century ago; metal concentrations in the immediate vicinity of mining sites are much higher. (Auen-Wisconsin)
W77-03778

DISTRIBUTION OF LOW-MOLECULAR-WEIGHT HYDROCARBONS IN SOUTHERN BEAUFORT SEA,
Department of the Environment, Victoria (British Columbia). Ocean Chemistry Div.
R. W. Macdonald.
Environmental Science and Technology, Vol. 10, No. 13, p 1241-1246, December, 1976. 5 fig, 10 ref, 2 tab.

Descriptors: *Organic compounds, *Sea water, *Water pollution, Wastes, Methane, Bottom sediments, Seepage, Continental shelf, Drilling, Water quality, Ships, Water pollution sources, Surface waters.
Identifiers: *Beaufort Sea, Ballast tanks, Dumping.

Seawater concentrations of C(1)-C(4) hydrocarbons were measured in the summers of 1974 and 1975 in the Southern Beaufort Sea continental shelf region. In general, there was good agreement between the levels of methane found in the surface waters of the Beaufort Sea and those found in similar environments by others. A few high methane concentrations were found, especially

near the bottom, and were attributed to seepage from the sediments. C(2)-C(4) saturated hydrocarbon concentrations were low, in contrast to other shelf areas where extensive shipping, ballast tank dumping, and drilling have occurred. Consequently, their concentrations could serve as useful indicators of deterioration of water quality in this area by future shipping or drilling activities. Unsaturated C(2)-C(4) hydrocarbon concentrations tended to be somewhat lower than those reported for other oceanic regions, possibly a consequence of low biological productivity in the shelf area at that time of year. (Witt-IPC)
W77-03793

EFFECTS OF FOREST CULTURAL TREATMENTS UPON STREAMFLOW,
Forest Station (USDA). Ogden, Utah. Intermountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 4C.
W77-03795

IDENTIFICATION OF GASOLINE CONTAMINATION OF GROUNDWATER BY GAS CHROMATOGRAPHY,
New York State Dept. of Health, Albany. Div. of Labs. and Research.
For primary bibliographic entry see Field 5A.
W77-03796

WATER QUALITY MONITORING: KANEOHE BAY AND SELECTED WATERSHEDS JULY TO DECEMBER 1975,
Hawaii Univ., Honolulu. Water Resources Research Center.
R. H. F. Young, L. S. Lau, S. K. Konno, and H. H. Lee.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 031, Price codes: A05 in paper copy, A01 in microfiche. Technical Report No. 98, May 1976. 87 p, 1 fig, 15 tab, 22 ref, 8 append.

Descriptors: Water pollution effects, *Water pollution sources, *Water quality, Surface runoff, Estuarine environment, Pollutants, Organic loading, Bioindicators, *Hawaii, *Monitoring, Bays, Watersheds(Basins).
Identifiers: *Kaneohe Bay(HI), Oahu.

A Kaneohe Bay and watershed water quality monitoring survey was conducted to ascertain a dry-weather quality baseline. Stations upstream of highly developed areas and downstream near stream mouths were selected to determine the effect of land development on water quality; bay stations were located off stream mouths, over sewer outfalls in the southern sector and the main channels of the bay. Results yielded poorer quality in the more developed southern and central subareas compared to the less developed northern subarea, poor quality off stream mouths and at bay sewer outfalls. Water quality standards for Class AA (bay) and 2 (stream) waters were exceeded in the case of nutrients (N and P) and coliform bacteria, but were met in the case of pH and dissolved oxygen. Loading rates, based on mean flow data and parametric concentrations for N and P compared against 1968 data, indicate a twofold increase for the southern subarea, a lesser increase for the central subarea, and relatively little change for the northern subarea. The bay water contained but a few ppt of alpha and gamma chlordane, dieldrin, and PCP; stream water samples were generally slightly higher in concentration. DDT, DDD, DDE, lindane, heptachlor, and PCB were not detected. The highest level, although low in ppt of pesticides, was found in stream water draining developed land. Heavy metals, Cd, Cr, Cu, Pb, Hg, Ni, Zn, were present in bay waters in low background concentrations on the order of a few ppb. No gradation in heavy metal concentrations was observed in different parts of the bay and stream contents were comparable to those in the bay.
W77-03826

MIXING OF SUBMERGED TWO-DIMENSIONAL BUOYANT JETS IN UNIFORM BODIES OF WATER IN THE ABSENCE AND PRESENCE OF WIND ACTION,
California Univ., Berkeley. Div. of Hydraulic and Sanitary Engineering.
For primary bibliographic entry see Field 8B.
W77-03828

THE DECOMPOSITION OF LEAVES IN TWO SOUTHERN CALIFORNIA STREAMS,
California Univ., Santa Barbara. Dept. of Biological Sciences.
S. D. Hart.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 036, Price codes: A03 in paper copy, A01 in microfiche. Master of Arts Thesis, June 1975. 33 p, 8 fig, 3 tab, 17 ref. (California Water Resources Center Project UCAL-WRC-W-492). OWRT A-055-CAL(1).

Descriptors: *Decomposing organic matter, *Steams, *Leaves, *California, Bacteria, Fungi, Productivity, Degradation(Decomposition), Biodegradation.
Identifiers: Goleta(Calif), Santa Barbara(Calif), *Decomposition rates(Leaves).

Woodland streams are known to derive most of their biological energy from inputs of organic material that originated in adjacent terrestrial systems. Much of this material is in the form of intact tree leaves. Once submerged, leaves lose weight over time at a species-specific rate. Differences between leaf species are associated with the initial composition of the leaf and the rate of colonization by microorganisms principally fungi and bacteria. The effect of differences between leaf species on stream productivity is unknown. Results are discussed of a study comparing rates of decomposition of leaves of locally important trees in two southern California streams. (Snyder-California, Davis)
W77-03829

A MATHEMATICAL MODEL FOR SIMULATING WATER QUALITY UNDER NON-STEADY STATE CONDITIONS,
North Carolina State Univ., Raleigh. Dept. of Civil Engineering.
A. K. T. Basaran.
PhD Thesis, 1976. 169 p, 18 fig, 6tab, 74 ref, 2 append. OWRT B-081-NC(1), 14-31-0001-5099.

Descriptors: *Mathematical models, *Water quality, *Simulation analysis, Streamflow, River forecasting, Stream forecasting, *North Carolina, Estuaries, *Path of pollutants.
Identifiers: Conservative substances, Non-conservative substances, *Chowan River Estuary(NC).

The study presents the development and verification of a mathematical model capable of simulating both the hydrodynamics and the water quality, as functions of time and space, in an estuary or a river which can be described by one-dimensional, unsteady mass transport and hydraulic equations. The hydrodynamic portion of the model is designed to accommodate six alternative hydraulic boundary conditions. In addition, this portion can be used to study the effect of wind on the water movement and in turn, on the pollutant distribution. The water quality portion of the model is capable of simulating conservative and non-conservative substances and coupled reaction systems. The 'sources' and 'sinks' associated with each substance considered include external and internal point and non-point sources and sinks. The model is calibrated and verified using the field data collected over a six-day period on the Chowan River Estuary, NC USA. Excellent agreement is obtained between the predicted and the measured values at the end of the sixth day. Unfortunately, at the time of the study, field data on wind and some of the 'sources' and 'sinks' were not available and therefore, could not be included in the model verification. (Stewart-North Carolina State)
W77-03831

RIVER AND COOLING WATER TEMPERATURE FLUCTUATIONS,
Minnesota Univ., Minneapolis. Dept. of Civil E
gineering; and Minnesota Univ., Minneapolis.
Anthony Falls Hydraulic Lab.
H. Stefan, and V. N. Chau.
Journal of the Hydraulics Division, Americ
Society of Civil Engineers, Vol. 102, No. HY
Proceedings Paper 12514, p 1613-1627, Novemb
1976. 9 fig, 1 tab, 12 ref, 2 append.

Descriptors: *Cooling water, *Water temperatu
*Mississippi River, Discharge(Water), Dispersi
Rivers, Effluents, Outlets, Mixing, Monitori
Water quality, *Thermal pollution, Time ser
analysis, Waste disposal, Water pollution sourc
Powerplants, Path of pollutants.
Identifiers: *Mixing length, Extreme value ana
sis, Nonlinear curve fitting, Seasonal periodiciti
Autocovariance, Spectral analysis.

Cooling water discharged from a powerpl
changed the fluctuating water temperature char
teristics of a receiving river in a clearly detecta
way. Daily and hourly water temperature d
from two powerplant sites on the Upper Mississ
pi River were used to compute for illustration
magnitude of such differences. Extreme va
analysis, autocovariance and spectral analys
and nonlinear curve fitting methods were appli
Amplitudes of seasonal periodicities, diur
periodicities, and random components were det
mined. The results indicated that time series ana
sis of water temperatures measured downstre
from an existing cooling water outfall may prov
equally, or even more, realistic and useful inf
mation on the size of a cooling water plume
quasi-instantaneous surveys of spatial water te
perature distributions provide. (Roberts-ISWS)
W77-03834

PREOPERATIONAL AND OPERATIONAL HYDROTHERMAL FIELD DATA ACQUISITION AND ANALYSIS,
Karlsruhe Univ. (West Germany). Institut F
Hydromechanik.
M. Markofsky.
Journal of the Hydraulics Division, Americ
Society of Civil Engineers, Vol. 102, No. HY
Proceedings Paper 12597, p 1711-1723, Decem
1976. 14 fig, 6 ref, 1 append.

Descriptors: *Thermal pollution, *Powerplan
*Water temperature, *Mathematical models, D
collections, Dyes, Surveys, Currents(Wat
Regulation, Tides, Dispersion, Hydrolo
Hydrothermal studies.
Identifiers: *Thermal plume, Current patter
Dispersion coefficient, Synoptic temperature p
terns.

Calibration of mathematical models for therm
plume prediction, design considerations, and re
latory requirements provides further motivat
for obtaining field data during both the preope
tional and operational status of the plant. An an
ysis of the parameters which are measured dur
hydrothermal surveys was given. Field techniq
examined included calibrating mathemati
models for current prediction from measured t
and current patterns; determining dispersion co
ficients; developing synoptic temperature patte
from off-boat measurements; and flushing surv
in coastal waters. The consideration of us
operational monitoring of temperature for
evaluation of low induced temperature rises on
order of 1.5F (0.83C) yields the conclusion that
operational monitoring should not be aimed
measuring these temperature rises directly b
rather, at verifying that the physical paramet
used in the mathematical modeling of hydroth
mal conditions were correctly evaluated. (L
ISWS)
W77-03837

N INVESTIGATION INTO THE EFFECTS OF ORESTRY PLANTATIONS ON THE WATER UALITY OF UPLAND RESERVOIRS IN ORTHERN IRELAND,
inistry of Agriculture, Crumlin (Northern Ireand). Freshwater Biological Investigation Unit.
E. Gibson.
ater Research, Vol. 10, No. 11, p 995-998, 1976.
ab, 5 ref.

escriptors: *Water quality, *Reservoirs, *One data collections, *Forest management, On-site vestigations, Lakes, Water analysis, Chemical alysis, Bioassay, Fertilization, Water pollution urces, Sampling, Analysis, Evaluation, itrogen, Phosphorus, Color, Turbidity, Conducvity, Iron, Hydrogen ion concentration, Foreign untries.
entifiers: *Northern Ireland.

study was made of water quality of a wide range Northern Ireland lakes to determine the effect the fertilization of forestry plantations. Twenty- reservoirs were sampled during December 74. From each reservoir, three samples were ken and then bulked to make one composite for ch reservoir. Lakes with fertilized forest tchments contained very high phosphorus vels. Bioassay with Selenastrum suggested that trogen and phosphorus were the only elements niting growth, and the supply of iron and trace etals was sufficient for large crops in nearly all ses. (Humphreys-ISWS)
77-03840

ATERFOWL AND ACID PRECIPITATION IN ORWAY, (IN DANISH),
ologisk Museum, Oslo (Norway).
or primary bibliographic entry see Field 5C.
77-03841

COSYSTEM OF THE RIVER PIVA AND IOLOGICAL VALORIZATION OF ITS ATERS, (IN SERBO-CROATIAN),
agreb Univ. (Yugoslavia). Inst. of Zoology.
Matonickin, Z. Pavletic, K. Zunjic, and I.
abdija.
las Repub Zavoda Zast Prir Prir Muz Titogradu p 61-79, 1975.

escriptors: Rivers, *Ecosystems, *Water pollun, Water quality, Industrial wastes, Biology.
lentifiers: *Valorization, *Yugoslovia(River iva).

n ecological-biocenological analysis of the River iva showed that the biocenoses which develop in is river are typical of upper courses of karst vers. A total 106 spp. of plants and animals were und. The water of the River Piva is on boundary etween 1st and 2nd degree pollution. Only the ring region has a clearly expressed 2nd degree. longitudinal section of biological water quality is esented graphically.--Copyright 1976, Biological bstracts, Inc.
77-03852

CCUMULATION AND DISTRIBUTION OF OTAL MERCURY IN ESTUARINE SEDIENTS,
edford Inst. of Oceanography, Darmouth (Nova cotia). Atlantic Geoscience Centre; and Bedford st. of Oceanography, Dartmouth (Nova Scotia).
nvironmental Marine Geology.
. E. Cranston.
stuarine and Coastal Marine Science, Vol. 4, No. p 695-700, November 1976. 2 fig, 3 tab, 18 ref.

escriptors: *Mercury, *Estuaries, *Sediments, Canada, Cores, On-site investigations, Sampling, valuation, Measurement, Chemical analysis, Distribution, Analysis, Heavy metals, Water polution sources, *Path of pollutants, Statistical ethods.
lentifiers: *Nova Scotia, *La Have River.

The mercury concentrations found in sediment cores from an estuary displayed maximum values in an area where the salt water influence on the river becomes significant. Statistical analyses indicated that the mercury concentrations are associated with fine sediments located in a specific area within the estuary. This was interpreted as resulting from mercury adsorption on sedimenting particulate matter. Organic carbon concentrations reach their highest values in the same area, but they do not correlate to a significant degree with the mercury data. The organic carbon concentrations appear to result from accumulation of vegetation debris and precipitation of dissolved organic matter. Mercury concentration gradients with depth in the sediment core are not evident. This is probably due to physical and biological mixing within the sedimentary environment. (Humphreys-ISWS)
W77-03857

HYDROLOGY OF THE SOLID WASTE BURIAL GROUND, AS RELATED TO THE POTENTIAL MIGRATION OF RADIONUCLIDES, IDAHO NATIONAL ENGINEERING LABORATORY,
Geological Survey, Boise, Idaho. Water Resources Div.
J. T. Barraclough, J. B. Robertson, V. J. Janzer, and L. G. Saindon.
Available from the National Technical Information Service, Springfield, VA 22161 as IDO-22056, Price codes: A09 in paper copy, A01 in microfiche. Open-file report 76-471, August 1976. 186 p, 35 fig, 20 tab, 42 ref, append.

Descriptors: *Path of pollutants, *Aquifers, *Radioactive waste disposal, *Underground waste disposal, *Idaho, Data collections, Groundwater, Hydrogeology, Geochemistry, Ultimate disposal.
Identifiers: Idaho National Engineering Laboratory, *Radionuclides.

A study was made (1970-1974) to evaluate the geohydrologic and geochemical controls on subsurface migration of radionuclides from pits and trenches in the Idaho National Engineering Laboratory (INEL) solid waste burial ground and to determine the existence and extent of radionuclide migration from the burial ground. A total of about 1,700 sediment, rock, and water samples were collected from 10 observation wells drilled in and near the burial ground of Idaho National Engineering Laboratory, formerly the National Reactor Testing Station (NRTS). Within the burial ground area, the subsurface rocks are composed principally of basalt. Wind- and water-deposited sediments occur at the surface and in beds between the thicker basalt zones. Two principal sediment beds occur at about 110 feet and 240 feet below the land surface. The average thickness of the surficial sedimentary layer is about 15 feet while that of the two principal subsurface layers is 13 and 14 feet, respectively. The water table in the aquifer beneath the burial ground is at a depth of about 580 feet. Fission, activation, and transuranic elements were detected in some of the samples from the 110- and 240-foot sedimentary layers. (Woodard-USGS)
W77-03874

WASTE-ASSIMILATION STUDY OF KOSHKONONG CREEK BELOW SEWAGE-TREATMENT PLANT AT SUN PRAIRIE, WISCONSIN,
Geological Survey, Madison, Wis. Water Resources Div.
R. S. Grant.
Open-file report 76-655, November 1976. 44 p, 20 fig, 12 tab, 7 ref.

Descriptors: *Waste assimilative capacity, *Self-purification, *Streams, *Sewage effluents, *Industrial wastes, *Wisconsin, Sewage treatment, Waste water disposal, Path of pollutants, Streamflow, Flow rates, Tracers, Methodology, Water quality standards, Model studies, Dissolved oxygen.
Identifiers: *Sun Prairie(Wisc).

A waste-load-assimilation study of a reach of Koshkonong Creek below the Sun Prairie, Wisconsin, sewage-treatment-plant outfall indicated that a high level of treatment would be required to meet Wisconsin water-quality standards. To maintain a minimum dissolved-oxygen concentration of 5 mg/liter during the critical summer low-flow period, 5-day carbonaceous biochemical-oxygen demand in waste discharges should not exceed 5 mg/liter and ammonium nitrogen should not exceed 1.5 mg/liter. Advanced treatment with denitrification is required because stream-reaeration coefficients are not high enough to offset deoxygenation caused by an abundance of attached biological slimes. The slimes apparently consumed dissolved oxygen at a rate of about 110 mg/liter per day at the time of the stream survey. During the critical summer low-flow period, natural stream discharge is very small compared to waste-water discharge, so benefits of dilution are insignificant. An evaluation of two proposed alternative waste-water discharge sites indicated that the present discharge site is hydraulically superior to these sites. Stream-reaeration coefficients used in the study were based on measurements using the radioactive-tracer method. (Woodard-USGS)
W77-03876

ABATEMENT OF NITRATE POLLUTION IN A PUBLIC-SUPPLY WELL BY ANALYSIS OF HYDROLOGIC CHARACTERISTICS,
Geological Survey, Laguna Niguel, Calif.
For primary bibliographic entry see Field 5G.
W77-03879

DISTRIBUTION AND TREND OF NITRATE, CHLORIDE, AND TOTAL SOLIDS IN WATER IN THE MAGOTHY AQUIFER IN SOUTHEAST NASSAU COUNTY, NEW YORK, FROM THE 1950'S THROUGH 1973,
Geological Survey, Mineola, N.Y. Water Resources Div.
H. F. H. Ku, and D. J. Sulam.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-260 519/As, Price codes: A04 in paper copy, A01 in microfiche. Water-Resources Investigations 76-44, August 1976. 47 p, 27 fig, 4 tab, 9 ref.

Descriptors: *Path of pollutants, *Aquifers, *Nitrates, *Chlorides, *Dissolved solids, Water quality, Septic tanks, Water pollution sources, *New York.
Identifiers: *Long Island(NY), *Magothy aquifer.

Concentrations of nitrate, chloride, and total solids in water in the Magothy aquifer, southeast Nassau County, N.Y., show a steadily increasing trend from the early 1950's through 1973. Vertical distribution of nitrate, chloride, and total-solids concentrations as shown in cross sections of the study area indicate downward movement of these constituents from tens of feet to a few hundred feet in this time period. Maximum concentrations are in a zone underlying the areas of Westbury, Hicksville, and Plainview. Nitrate (as nitrogen) concentration increased from 4-5 mg/liter to 7 mg/liter in the area of Westbury and from 3 to 10 mg/liter in Plainview during the period 1950-73. Lowest nitrate concentrations are in the area south of a line running from North Merrick to South Farmingdale. Also, during the period analyzed (1950-73), a 10-mg/liter line of equal-chloride concentration on a cross section in the Westbury area moved downward a distance of less than 50 feet, and in the area of Hicksville, nearly 150 feet. Total-solids concentration doubled during the period 1950-73 in the area of Plainview, where maximum downward movement of pollutants was observed. (Woodard-USGS)
W77-03887

RESERVOIR-SYSTEM MODEL FOR THE WILLAMETTE RIVER BASIN, OREGON,
Geological Survey, Jackson, Miss. Water Resources Div.
For primary bibliographic entry see Field 2E.
W77-03891

AN EVALUATION OF SURFACE-MINE SPOILS AREA RESTORATION IN WYOMING USING RAINFALL SIMULATION,
Geological Survey, Lakewood, Colo. Water Resources Div.
G. C. Lusby, and T. J. Toy.
Earth Surface Processes, Vol 1, p 375-386, 1976. 4 fig, 1 tab, 9 ref.

Descriptors: *Rainfall simulators, *Land reclmation, *Coal mines, *Strip mines, *Spoil banks, *Wyoming, Runoff, Sediment yield, Slope stabilization, Vegetation effects, Clays, Planning, Evaluation, Erosion control.

A recently developed rainfall simulator was used to apply 'rainstorms' on restored spoils areas at two coal mining sites in Wyoming. Runoff and sediment yield were considerably greater from the reworked areas compared to similar measurements on nearby undisturbed areas. This may possibly be attributed to the fact that in the disturbed areas mean slopes were generally greater, there was more clay at the surface, and concentration of roots was not as great as in the undisturbed areas. The rainfall simulator appears to be a valuable tool in determining baseline data for later comparison with data from areas under rehabilitation. (Woodard-USGS)
W77-03892

ESTABLISHMENT OF OPERATIONAL GUIDELINES FOR TEXAS COASTAL ZONE MANAGEMENT. SPECIAL REPORT I: WATER QUALITY MODELLING AND MANAGEMENT STUDIES FOR CORPUS CHRISTI BAY: A LARGE SYSTEM APPROACH,
Texas Univ., at Austin. Center for Research in Water Resources.
E. G. Fruh, B. R. Penumalli, and R. H. Flake.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-247 458, Price codes: A11 in paper copy, A01 in microfiche. National Science Foundation, Research Applied to National Needs (RANN) Report No. NSF-RA-E-75-054, 1975. 239 p, 41 fig, 26 tab, 71 ref. GI-44363.

Descriptors: *Texas, *Bays, Management, *Water quality, *Estuaries, *Model studies, Baseline studies, Hydrodynamics.
Identifiers: *Coastal zone management(Tex), *Corpus Christi Bay(Tex), Operational guidelines.

A large systems approach to the problem of estuarine water quality modelling and management is considered. The steady state estuarine water quality model is formulated as a large scale matrix. This model has a simple structure that is ideally suited to optimization methods for quantitative water quality management analysis. The approaches developed here have been applied to Corpus Christi Bay on the Gulf Coast of Texas. The objective was to minimize the total cost of treatment, and the corresponding variables of optimization were the levels of treatment to which various sources have to be treated. Four optimal policies for quantitative water quality management corresponding to different constraint conditions are determined for Corpus Christi Bay. (Sinha-OEIS)
W77-03898

PHOTOGRAMMETRIC EXPERIMENTS ON NEARSHORE MIXING AND DIFFUSION,
Coastal Engineering Research Center, Fort Belvoir, Va.
For primary bibliographic entry see Field 2L.
W77-03907

PORT COLLECTION AND SEPARATION FACILITIES FOR OILY WASTES. VOL VI. IMPACT OF OFFSHORE TERMINALS ON CONTIGUOUS PORTS,
Harris (Frederic R.), Inc., New York.
For primary bibliographic entry see Field 5G.
W77-03923

A REPORT ON THE METHYLMERCURY SITUATION IN PAR POND,
Georgia Univ., Athens. Dept. of Zoology.
J. E. Schindler, D. J. Williams, and J. J. Alberts.
Report No. SRO-825-1, June 1975. 21 p. 1 fig., 4 tab, 24 ref. AT(38-1(-825.

Descriptors: *Mercury, *Impoundments, *Cooling water, *Fish populations, Bottom sediments, Absorption, Nuclear reactors, Gas chromatography, Fish behavior, Ecology.
Identifiers: *Methylmercury, Bioaccumulation, *Par Pond(Geo), Savannah River(Geo).

Hypotheses are examined for various pathways of mercury methylation in a cooling water pond of the Atomic Energy Commission's Savannah River Plant, with the objective of reducing methylmercury concentrations in the fish population. The ratio of methylmercury to total mercury in crappie and suckers ranged from 70-100%; other fish had 100% methyl to total mercury; the top predator, bass, had the highest total mercury concentrations among all fish. Several postulates are considered about methylmercury source(s), including that the mercury methylation occurred in vivo and was a function of the physiological state of the fish, which would explain the large intraspecific variability of methylmercury; or that methylation is a function of the general environment and the behavioral differences of the trophic relations of the fish lead to their variable accumulations. All tests showed that understanding of mercury behavior in the aquatic environment is inadequate. Just as the potential for the alkylation of mercury in the sediments of the pond could be demonstrated, it can be shown that other aquatic environments have varying potentials for electron transport, mercury reduction and alkylation. Par Pond sediments contained very low mercury concentrations. Organic ligand methylation and mercury reduction may be a possible mechanism to account for both the mercury distribution and the methylmercury concentration in the fish. (Auen-Wisconsin)
W77-03954

TECHNICAL AND MICROECONOMIC ANALYSIS OF CADMIUM AND ITS COMPOUNDS,
Versar, Inc., Springfield, Va.
D. H. Sargent, and J. R. Metz.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-244 625, Price codes: A10 in paper copy, A01 in microfiche. Report No. EPA 560/3-75-005, June 1975. 209 p. 11 fig., 36 tab., 107 ref. 68-01-2926.

Descriptors: *Cadmium, *Public health, *Industrial wastes, *Economics, Toxicity, Toxins, Water pollution sources, Feasibility studies, Cost-benefit analysis, Industrial production, Implied benefits, Pollution abatement, Legal aspects, Regulation, Soil contamination.
Identifiers: *Plastics industry, Electroplating industry, Nickel-cadmium batteries, Primary zinc industry, Secondary zinc industry, Secondary copper industry.

Two alternative sets of controls of cadmium are recommended by a study of the role played by the metal and its compounds in the American economy, its effects in the environment, the need for limitations, and their economic feasibility. To optimize various abatement possibilities, comparisons were made among two types of data: (1) documentation of cadmium production, uses, prevalence and pollutant pathways; and (2) assessments of present and projected health hazards from the metal. Data is provided on cadmium role in the primary zinc industry, in electroplatin in plastics, in nickel-cadmium batteries and in t secondary metals industry. In drawing up t recommendations, 39 control alternatives we first posited, including projections identifying su industries likely to be affected by each contr probable implementation feasibility, effectivene and estimated cost. From these, minimal and ma imal recommendations were drawn up. Minim controls would include continued air and wat pollution abatement, environmentally-prop disposal on land of industrial cadmium wastes, a regulation of application rates to agricultural lan of cadmium-bearing materials. Maximal reco mendations would range in severity from limit tion of cadmium impurities in zinc indust products, to outright restriction or prohibition cadmium imports to the U.S. (Harris-Wisconsin)
W77-03963

GROUND-WATER POLLUTION NEAR LANDFILL,
Rhode Island Univ., Kingston. Dept. of Civil a Environmental Engineering.
W. E. Kelly.
Journal of the Environmental Engineering Di sion, American Society of Civil Engineers, V 102, No EE6, Proceedings Paper 12609, p 11 1199, December 1976. 12 fig, 2 tab, 23 ref, 1 a pend.

Descriptors: *Water pollution sources, *Landfi *Aquifers, *Rhode Island, Groundwater, Condu tivity, Chlorides, Water quality, Resistivit Groundwater movement, Test wells, Comput models, Data collections, Water table, Water sa pling, Path of pollutants.
Identifiers: Surface resistance, Trend surfa analysis.

Evaluation of existing landfills, particularly tho with the potential to affect public water supplie is a necessary, but often time-consuming, task. study was described in which sampling wells, te borings, electrical resistivity, and comput models were used. The importance of integrati all geohydrologic data; the usefulness of trend su face analysis, surface resistivity measurement and computer modeling; and the value of specif conductance as a pollution indicator we emphasized. (Visocky-ISWS)
W77-03991

COAL PILE LEACHATE - QUANTITY AN QUALITY CHARACTERISTICS,
Pickard and Anderson, Auburn, N.Y.
W. C. Anderson, and M. P. Youngstrom.
Journal of the Environmental Engineering Div sion, American Society of Civil Engineers, V 102, No EE6, Proceedings Paper 12626, p 123 1253, December 1976. 10 fig, 3 tab, 7 ref, 1 appen

Descriptors: *Leachate, *Coal mine wastes, *Ne York, Acid mine water, Waste water(Pollution Pollutants, Design, Environmental engineerin Industrial wastes, Thermal powerplants, Electr power, Runoff, Utilities, Water pollution source Base flow, Groundwater, On-site data collection Water quality, *Monitoring, *Path of pollutants.
Identifiers: *Coal piles, Stockpiles.

A detailed monitoring of an existing coal pile Ithaca, New York, was performed to determi coal pile leachate (CPL) quantity and quality vari tions. The total quantity of CPL generated consis of two components, base flow and surface flo During periods of no precipitation, retaine moisture within the coal pile dissolves minera that are flushed from the pile by precipitation. Fo lowing the first flush, only minor concentration minerals are carried from the pile in continui CPL flows. This is particularly true of total iro copper, manganese, chromium, and zinc. The CP pH was found to be generally stable. CPL desig quantity and quality parameters can be develope

wing the collection of sufficient monitoring for each specific site in order (1) to permit lopment of flow and primary contaminant ographs which describe the flush phenomena, 2) to permit determination of base flow rates minimum contaminant concentrations. cky-ISWS)
03992

RENT PROBLEMS OF HYGIENIC STANDIZATION OF NEW CHEMICAL SUBNCES, (IN RUSSIAN),
kovskii Gosudarstvennyi Meditsinskii Institut SSR).
rimary bibliographic entry see Field 5C.
04015

POINT SOURCES OF POLLUTION: A ERAL PERSPECTIVE,
ronmental Protection Agency, Washington, Div. of Water Planning.
rimary bibliographic entry see Field 5G.
04017

N TRANSPORT IN A LAKE TAHOE TRIBUY AND ITS POTENTIAL INFLUENCE N PHYTOPLANKTON GROWTH,
ornia Univ., Richmond. Sanitary Engineering arch Lab.
Elder, K. E. Osborn, and C. R. Goldman.
r Research, Vol. 10, 1976. p. 783-787, 1 tab., 4 21 ref.

riptors: *Iron, Metals, *Trace elements, ophication, Aquatic algae, Limnology, ients, Primary productivity, Water quality, ytical techniques, *Phytplankton, California, da.
ifiers: *Ion transport, Lake Tahoe(Calif-, *Ward Creek(Calif).

r from Ward Creek, a tributary of Lake e, California-Nevada, was analyzed for iron nt from October 1972 to April 1974. Two tical techniques were used: a phenanthroline colorimetric method which uced total iron data, and X-ray fluorescence h produced total iron data, and X-ray escence which permitted separate determina- of dissolved and particulate iron. Iron conations show marked seasonal variability. The iron transport during a one-year period in 73 was approximately 6000 kg or 0.2% of the iron content of Lake Tahoe. Most iron in m water of the Lake Tahoe basin results from on, producing a high predominance of parte forms. Because of the possiblity of various down mechanisms, this iron is potentially ulatory to algal growth in the lake. (Katz)
04022

CENTRATION OF POLYVALENT ALS BY SEAWEEDS IN VOSTOK BAY, OF JAPAN,
lemiya Nauk SSSR, Vladivostok.
rimary bibliographic entry see Field 5C.
04023

H SEAS OIL POLLUTION: PARTICULATE ROLEUM RESIDUES IN THE NORTH ATTIC,
ord Inst. of Oceanography, Darmouth (Nova a).
. Levy, and A. Walter.
nal of the Fisheries Research Board of da, Vol. 33 (1976), p. 2781-2791, 5 tab., 9 fig., f.

riptors: Oil *Oil pollution, Oil spills, Water tion, Solid wastes, Water pollution sources, sportation, Navigation, Atlantic Ocean, da, Path of pollutants.

Identifiers: Particulate petroleum residues, Tar balls, North Atlantic Ocean, Gulf Stream, North Atlantic Current System, Shipping, Tanker traffic.

The results of a continuing invetigation into the occurrence and distribution of particulate petroleum residues on the surface of the North Atlantic are presented. From 1971 to 1974 more than 850 samples were cllected from the North Atlantic on transects between the east coast of Canada and South America, the Caribbean, Baffin Bay and surrounding waters, the Labrador Sea, and the Azores. Repeated sampling was carried out in the Gulf of St. Lawrence and the region between Nova Scotia and Bermuda. The results indicate that the waters nort of the Gulf Stream-North Atlantic Current system were virtually free from floating petroleum residues, while the waters of the Gulf Stream Sargasso Sea, and Caribbean Sea were much more heavily polluteed. SIthough concentrations as high as 91.8 mg/m2 were encountered, the general level of pollution was much less with tar contents in suthen waters following a lognormal distribution with a geometric mean of 0.16 mg/m2. The geographical distribution of tar is interpreted in terms of inputs from shipping and tanker traffic, and surface circulation patterns. (Katz)
W77-04025

THE KINETICS OF ACCUMULATION AND EXCRETION OF FERRIC HYDROXIDE IN MYTILUS EDULIS (L.) AND ITS DISTRIBUTION IN THE TISSUES,
Institute of Marine Biochemistry, Aberdeen (Scotland).
For primary bibliographic entry see Field 5C.
W77-04028

ARSENIC CONCENTRATIONS IN SOME COEXISTING MARINE ORGANISMS FROM NEWFOUNDLAND AND LABRADOR,
Fisheries and Marine Service, St. John's (Newfoundland). Biological Station.
For primary bibliographic entry see Field 5C.
W77-04036

WEED CONTROL AND THE ENVIRONMENT, (IN FRENCH),
Organisation Europeenne et Medterraneenne pour la Protection des Plantes.
G. Mathys.
Bull Oepp (Organ Eur Mediterr Prot Plant 5(2), p 87-100, 1975.

Descriptors: *Aquatic weed control, *Herbicides, Water pollution sources, Toxicity, *Path of pollutants, *Soils, Environment, Pesticide residues, Ureas.
Identifiers: *Germany.

In the Federal Republic of Germany, the use of 7 herbicides was restricted in 1974 mainly on the grounds of their potentials as water pollutants. The 13 herbicides which had the highest acute toxicity to rats are discussed. Fodder plants may contain more residues than those destined for human consumption, as in the case of cereals. There is little evidence of accumulation in human and animal tissues, except for fish in which diuron and its metabolite 3,4-dichloraniline accumulates. Birds exposed to relatively high concentrations of various herbicides showed considerable resistance, but aquatic herbicides had a substantial impact on the composition of the water fauna and flora. Special attention was given to the fate of herbicides in soil. The principal pathways of inactivation are discussed and the Freundlich formula used to calculate the degree of adsorption is given. Most herbicides are subjected to degradation by microorganisms, most of which have been identified. In consideration of many factors interfering in these processes and the role played by weather conditions, any attempt at evaluating the life-time and fate of the compounds remains uncertain. Nevertheless, an approximation of the persistence can be established. The effect of 5 substituted urea herbicides on the soil microflora, when applied at high concentrations and measured in terms of CO2 production, was discussed. This review indicates that herbicides are not likely to present real hazards, providing that certain compounds do not reach aquatic systems.--Biological Abstracts, Inc.
W77-04041

THE CONDITIONS FOR BIODEGRADATION OF PETROLEUM HYDROCARBONS AT SEA,
Aix-Marseille-3 Univ. (France). Laboratoire de Microbiologie.
S. Tagger, L. DeVeze, and J. Le Petit.
Marine Pollution Bulletin, Vol. 7, No. 9, September 1976, p 172-174, 2 fig, 6 ref.

Descriptors: Oil, *Oil pollution, Oil wastes, *Biodegradation, *Microbial degradation, Aquatic, *Microbiology, Digestion, Seawater, Industrial wastes, Effluents, Oil wastes, Water pollution.
Identifiers: *Petroleum biodegradation, Petroleum hydrocarbons, Marine bacteria, Petroleum refinery, Bacterial activity, Oil refinery effluent.

The hydrocarbon degradation potential of seawater appears higher in zones chronically polluted by these materials; they are characterized by an abundant bacterial development. The salinity of the effluent from a refinery and also its hydrocarbon content are factors affecting the speed of degradation. (Katz)
W77-04042

ACCUMULATION AND RELEASE OF PETROLEUM-DERIVED AROMATIC HYDROCARBONS BY FOUR SPECIES OF MARINE ANIMALS,
Texas A and M Univ. College Station. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W77-04045

DISTRIBUTION AND ABUNDANCE OF HEAVY METALS IN FINFISH, INVERTEBRATES AND SEDIMENTS COLLECTED AT A DEEP WATER DISPOSAL SITE,
National Marine Fisheries Service, Highlands, N.J. Sandy Hook Lab.; and National Marine Fisheries Service, Highlands, N.J. Middle Atlantic Coastal Fisheries Center.
R. A. Greig, D. R. Wenzloff, and J. B. Pearce.
Marine Pollution Bulletin, Vol. 7(10), Oct., 1976, p. 185-187, 2 tab., 9 ref.

Descriptors: Marine fish, *Heavy metals, Cadmium, Copper, Nickel, Zinc, Mercury, Crab, Chromium, Silver, Crustaceans, Arsenic compounds, Lead, Atlantic Ocean, New York, Monitoring, Sewage disposal, *Path of pollutant, *Distribution, Baseline studies.
Identifiers: *New York Bight, Deepwater disposal, Tissue concentration of metals.

Analyses of deep water finfish to several heavy metals indicate that deep water fish have less metal in muscle tissue than do fish taken from the continental shelf. Liver tissue from deep water fish also, generally, contain less metals. Sediments and a single invertebrate collected at deep water stations have also been analyzed for heavy metals. (Katz)
W77-04046

HYDROCARBONS IN A WILDERNESS LAKE,
Exxon Research and Engineering Co., Linden, N.J. Analytical and Information Div.
P. K. Starnes, and R. A. Brown.
Marine Pollution Bulletin, Vol. 7(7), 1976, p. 131-132.

Descriptors: *Oil, Carbon cycle, Spectrophotometry, Freshwater, Surface waters, Water quality, Limnology, Analytical techniques, Gas chromatography, *Canada, *Organic compounds, *Pollutant identification.
Identifiers: *Ontario, *Green Lake(Ont), Gas chromatographic trace, *Hydrocarbon traces, Natural hydrocarbons.

Hydrocarbons found in Green Lake, Ontario, Canada, are believed to be of natural origin coming from plant and animal organisms. (Katz)
W77-04048

MOLECULAR TEST FOR OIL POLLUTION IN SURFACE SEDIMENTS,
Strasbourg Univ. (France). Institut de Chimie.
M. Dastillung, and P. Albrecht.
Marine Pollution Bulletin, Vol. 7(1), January, 1976, p. 13-15, 3 fig., 20 ref.

Descriptors: Oil, Oil spills, *Oil pollution, Water pollution, *Sediments, Analytical methods, Chromatography, Laboratory tests, Sea water, *Pollutant identification, Gas chromatography, *Distribution, Path of pollutants.
Identifiers: Polycyclic biological markings, Pentacyclic triterpanes, Crude oil pollution, Surface sediments, Gas chromatogram, France.

Polycyclic biological markers, such as pentacyclic triterpanes, can be useful as 'molecular markers' in the study of crude oil pollution problems. This has been shown in the case of a weakly polluted surface sediment from the west coast of France. The use of these markers is based on the differences in their distribution, which depend on the degree of maturity of the geological sources. (Katz)
W77-04058

DISTRIBUTION OF HEAVY METALS IN TISSUES OF THE COMMON SEAL,
Liverpool Univ. (England). Dept. of Botany.
For primary bibliographic entry see Field 5C.
W77-04059

AN ASSESSMENT OF THE POLLUTION OF CORNISH COASTAL WATERS,
Atkins Research and Development, Epson (England).
R. E. N. Bradfield, R. W. S. M. Kingbury, and C. P. Rees.
Marine Pollution Bulletin, Vol. 7(10), Oct. 1976, p. 187-193, 3 tab., 6 fig.

Descriptors: Water pollution, Water pollution effects, Seawater, Water analysis, Water chemistry, Heavy metals, Marine algae, Marine plants, Benthic fauna, Benthic flora, Sewage, *Monitoring, Mine wastes, *Baseline studies, Pollutant identification.
Identifiers: *Cornwall coast(U.K.), Brown seaweed, Fucus vesiculosus, Water quality monitoring, Seaweed sampling stations.

A detailed survey of pollution was undertaken in five areas around the Cornwall coast in south-west England, at St. Austell and Mevagissey Bays, Falmouth Bay, Mounts Bay, St. Ives Bay and Portreath. The aim of the study was to establish baseline values against which subsequent changes could be detected and their importance evaluated. Three major investigations were undertaken in each area involving seawater sampling and analysis, heavy metal analysis of seaweed specimens and quantitative surveys of intertidal fauna and flora. In general, the areas studied showed few signs of being exposed to significant levels of industrial or sewage pollution. (Katz)
W77-04061

RADIOECOLOGICAL STUDY OF CHAROPHYTA, (IN RUSSIAN),
Akademiya Nauk Litovskoi, SSR, Vilnius. Inst. of Botany.
For primary bibliographic entry see Field 5C.
W77-04068

A STUDY ON THE INFLUENCE OF SALINITY FLUCTUATIONS UPON THE BACTERIAL FLORA OF THE LAGOON CIENAGA GRADE DE SANTE MARTA (COLOMBIA) AND THE ADJACENT COASTAL REGION, (IN GERMAN),
Kiel Univ. (West Germany). Institut fuer Meereskunde.
R. Jeske.
Kiel Meeresforsch 31(1), p 7-16, 1975.

Descriptors: *Salinity, *Bacteria, *Lagoons, Coasts, *Brackish water, Nutrients, Pigments, Hydrogen ion concentration, Water temperature, South America, Aquatic plants.
Identifiers: Agar, *Agrobacterium-stellulatum, Cienaga-Grande-de-Santa-Marta, *Columbia, Halophiles.

In the tropical brackish water lagoon Cienaga Grande de Santa Marta, the change of the bacterial population was studied during a period of dropping salinity from Sept.-Dec. 1973. Plate counts on ZoBell's Medium 2216 E with different salinities were made from a series of 11 sections through the lagoon, and compared with the salinity, temperature and pH of the water. Following the decrease of salinity, a mass development of halophilic bacteria can be observed. They decrease again at a salinity about 3%, while the fresh water bacteria reach their maximum. This group made up only 0.1-3.7% of the bacterial flora in the salinity range above 10%. Among the halophilic bacteria a brown pigmented organism occurs, while resembles Agrobacterium stellulatum, the most common brackish water bacterium of the Baltic Sea. Before the maximal increase of the fresh water bacteria, a pink colored population of halotelerant aquatic bacteria temporarily appears. As in the lagoon, the fresh water inflow influences the salinity and bacterial content in the adjacent coastal region. On a profile from the mouth of the Cienaga seaward the number of halophilic bacteria in the surface layer decreases within 11 nautical miles from 90,000 cfu colony-forming units/ml to 60-70 cfu/ml, that of fresh water from 2100 cfu/ml to 20-50 cfu/ml. The fresh water originates mainly from the Rio Magdalena. Between the mouth of the Magdalena and Santa Marta the surface samples show a terrestrial influence. The halophilic bacteria are most numerous with the shallow stations of high nutrient content and decrease with increasing distance from the coast. With the water of the river M Magdalena, halotolerant fresh water bacteria are transported to the surface layer of the bight, especially the pink organism which was found to be frequent in the Cienaga. In the surface water of Santa Marta the plate counts on sea water agar range from 390-20,500 cfu/ml, those on fresh water agar from 68-12,000 cfu/ml. The highest numbers coincide with the inflow of fresh water. The bacterial counts of the 10 mm samples make up about 10% of the surface values.--Copyright 1976, Biological Abstracts, Inc.
W77-04076

WATER POLLUTION OF THE RIVERS FLOWING EASTWARDS INTO THE BAY OF ISE, (IN JAPANESE),
R. Ota.
Jpn J Limnol 36(4), p 160-163, 1975.

Descriptors: Bays, Asia, Water pollution sources, *Phosphates, Rivers, *Nitrates, Organic matter, Path of pollutants.
Identifiers: *Ise Bay(Japan), *Japan.

From May-Oct. 1973, chemical analyses of the water of 11 main rivers flowing into Ise Bay, Japan, were performed 3 times. PO4-P,N N,NO3-N and organic-N are tabulated. The paku, Shidomo and Seta rivers flowing throug city containing organic substances in higher centrations derived mostly from urban sew The Inobe, Asake and Miya rivers flowing i garden city are relatively natural.--Copyright Biological Abstracts, Inc.
W77-04080

BACTERIAL ASSIMILATION OF ORGA MATTER IN WATERS WITH VARIOUS LUTION LEVELS, (IN RUSSIAN),
M. V. Fursenko.
Mikrobiologiya 44(3), p 505-510, 1975.

Descriptors: *Bacteria, *Organic matter, pollution, *Waste assimilative capacity.
Identifiers: Glucose, *Bacterial asimilation.

The assimilation of organic matter by bacte more intensive in polluted water. The maxima cose assimiliation rate depended on the numb bacteria and appeared to be 2 times higher in luted water and > 100 times higher in extre polluted water in comparison with clean wate equation for the dependence of the maxima similiation rate on the total number of bacte natural populations is suggested.--Copyright Biological Abstracts, Inc.
W77-04081

5C. Effects Of Pollution

CHANGE OF BIOCENOSES IN ARTIFI BODIES OF WATER DUE TO HUMAN IN VENTION, (IN RUSSIAN),
Rostov-on-Don State Univ. (USSR). Rese Inst. of Biology.
V. M. Kruglova.
Izv Sev-Kavk Nauchn Tsentra Vyssh Shk Es Nauki 3(3); p 55-57, 1975.

Descriptors: *Invertebrates, *Growth rates Water pollution effects, Bodies of water, Artif lakes, Shrimp, Mollusks, Reservoirs, *Fish organisms.
Identifiers: *Biocenses, Opossum, Polychaete

The introduction and acclimation of inverteb (opossum shrimp, polychaetes, mollusks, etc. fish food and their dispersal throughout reser have an effect on the growth of fishes, the pearance of new commercial fish species, an ratio of commercial species in catches.--Copy 1976, Biological Abstracts, Inc.
W77-03618

THERMAL EFFECTS ON AQUATIC ORG ISMS, ANNOTATED BIBLIOGRAPHY OF 1975 LITERATURE.
Oak Ridge National Lab., Tenn. Ecolo Sciences Information Center.
ORNL/EIS-88, October 1976, Edited and C piled by C. C. Coutant, S. S. Talmadge, R. F. rier, B. N. Collier, and N. S. Dailey, 235 p. 7405-eng-26.

Descriptors: *Environmental eff *Bibliographies, *Temperature, Aquatic life, dexing, Documentation, *Thermal pollu Aquatic animals, Thermal stress.

This is the fifth in a series of scientifically inde bibliographies concerning thermal effects aquatic organisms. 716 references are listed an dexes are provided for author, keywords, sub category, geographic location, taxon, and (alphabetical listing of keyword-in-context of nontrivial words in the title). Documents in w temperature is a variable or where it is impor in the experiment were included. Heat steriliza studies, laboratory studies that do not relate to environment, and seasonal field studies with

ific mention of temperature were not in-
ed. (ChiltoniORNL)
-03640

INFLUENCE OF TEMPERATURE ON THE
ENERGETICS OF THE CARNIVOROUS
NEFLY NYMPH, ACRONEURIA CALIFOR-
BANKS (PLECOPTERA: PERLIDAE),
fornia Univ., Davis. Dept. of Water Science
Engineering; and California Univ., Davis.
logy Graduate Group.
. Heiman, and A. W. Knight.
logy, Vol. 56, 1975, p 105-116, 6 fig, 5 tab, 26

criptors: *Environmental effects,
nperature, Energy budget, Growth rates,
spiration, *Stoneflies, Aquatic environment,
oratory tests, *Aquatic insects, Metabolism,
er temperature.

study describes in quantitative terms the
vth, food consumption, respiration, and
tion of the stonefly nymph, and indicates how
e factors are affected by changes in water tem-
ture. Eight constant-temperature baths were
ntained at temperature increments of 2C. The
erimental temperatures chosen approximated
average temperature in the field for that
od, in general from four degrees below the
mean to ten degrees above. At temperatures
roximating environmental levels, assimilation
ciency was approximately 86%, while gross
net growth efficiencies were 33% and 41%
ectively. Metabolic losses accounted for about
of the food consumed. Optimal temperature
es were concluded to be 16-22C in summer,
8C in fall, 6-12C in winter, and 10-16C in
ng. (Chilton-ORNL)
-03641

OCEEDINGS OF THE INTERNATIONAL
NFERENCE ON TRANSPORT OF PER-
ENT CHEMICALS IN AQUATIC
OSYSTEMS.
onal Research Council of Canda, Ottawa
ario).
primary bibliographic entry see Field 5B.
-03642

OCHEMICAL INTERACTION IN THE
ENTLY INDUSTRIALIZED STRAIT OF
ISO,
ford Inst., Dartmouth (Nova Scotia). Atlantic
science Center; and Bedford Inst. of Oceanog-
y, Dartmouth (Nova Scotia). Environmental
ine Geology.
primary bibliographic entry see Field 5B.
-03649

ACE METAL POLLUTION FROM A
TROPOLITAN AREA: SOURCES AND AC-
MULATION IN THE LOWER FRASER
ER AND ESTUARY,
sh Columbia Univ., Vancouver. Westwater
arch Centre.
primary bibliographic entry see Field 5B.
-03652

NSPORT OF SOME ORGANOCHLORINES
. C. WATERS,
n Fraser Univ., Burnaby (British Columbia).
. of Biological Sciences.
primary bibliographic entry see Field 5B.
-03653

VY METALS IN THE LOWER MISSISSIP-
igan Univ., Ann Arbor. Dept. of Environ-
al and Industrial Health.
primary bibliographic entry see Field 5B.
-03654

ADSORPTION ISOTHERMS FOR THE UPTAKE OF ZINC BY CLAY MINERALS IN A FRESH-WATER MEDIUM,
Washington State Univ., Pullman. Nuclear Radiation Center.
For primary bibliographic entry see Field 5B.
W77-03656

PARTITIONING AND UPTAKE OF PESTICIDES IN BIOLOGICAL SYSTEMS,
Dow Chemical U. S. A., Midland, Mich.
E. E. Kenaga.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystemsheld in Ottawa, Canada May 1-3, 1974. p II-19-II-22, 65 ref.

Descriptors: *Environmental effects, Pesticides, Ecosystems, Solubility, Biomass, Adsorption, *Absorption, Water, Pollutants, Path of pollutants, *Pesticide residues, Aquatic environment.

The paper is a condensation of a full paper which appears in the American Chemical Society Advances in Chemistry Series in 1974. Comparisons were made between natural bodies of water, blood and plant sap as transporting systems for pesticides and other chemicals. Uptake and distribution of pesticides in biological systems were related to water solubility, volatility from water, adsorption to soil organic matter, plant and animal organisms in aquatic ecosystems, effects of temperature, type of flow system, route of pesticide intake, specific types of organism tissue, and ratio of biomass to surface area for sorption. From pesticide bioaccumulation data it was found that the first period of residue pickup is due to adsorption and is often related to high surface area to mass ratio of the adsorbent. If the pesticide is high in fat solubility, low in water solubility and persitent in the environment, a continued increase in residues may take place until a steady state point is reached in live organisms. Such residue pickup is by absorption and such bioaccumulation can be detected at an early stage by comparison with baseline studies. (See also W77-03642) (Chilton-ORNL)
W77-03659

WATER-SEDIMENT DISTRIBUTION OF CHLORINATED HYDROCARBON PESTICIDES IN VARIOUS ENVIRONMENTAL CONDITIONS,
Missouri Univ., Rolla. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W77-03660

CHLORINATED HYDROCARBONS IN COASTAL MARINE ECOSYSTEMS,
Washington Univ., Seattle. Dept. of Oceanography.
S. P. Pavlou, R. N. Dexter, and J. R. Clayton, Jr.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p II-31-II-35, 3 tab, 25 ref.

Descriptors: *Environmental effects, *Organic compounds, *Chlorinated hydrocarbon pesticides, Polychlorinated biphenyls, Pollutants, Water pollution, Path of pollutants, Distribution, DDT, Water, Zooplankton, Sediments, Adsorption, *Pesticide residues.

Evaluation of the interaction of chlorinated hydrocarbons with various phases of the ecosystem is studied in terms of input mechanism, circulation characteristics, and primary productivity of the area under investigation. Considerations of transport within the ecosystem included spatial distribution and phase fractionation from ambient water. Significant variation was seen in the PCB/DDT ratio for the different phases and regions sampled. General trends showed that, for the outfall region, the total water concentrations in the plume were nearly equal, the surface particulates had accumulated 6 times as much PCB as DDT, the zooplankton had nearly the same distribution as the sludge, and the sediments were highly enriched in DDT. For the offshore region, the PCB/DDT ratio increased in all phases with the greatest increase shown by the zooplankton. It was concluded that the hydrocarbon distributions can be explained in terms of equilibrium adsorption partitioning. At low concentrations, equilibration favors the greatest portion in the water while suspended particulate matter and zooplankton accumulation is roughly proportional to the total masses of these phases. (See also W77-03642) (Chilton-ORNL)
W77-03661

MICROANALYSE DE L'INCORPORATION D'UN METAL LOURD DANS LES ECAILLES D'UN POISSON,
Institut National de la Recherche Scientifique, Rimouski (Quebec).
For primary bibliographic entry see Field 5A.
W77-03663

DYNAMICS OF MICROBIALLY PRODUCED FULVIC MATERIAL IN AQUATIC ENVIRONMENTS RELATIVE TO DIFFERENT CONDITIONS OF TEMPERATURE AND PH,
Institut National de la Recherche Scientifique, Rimouski (Quebec).
S. A. Visser.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p II-47-II-51, 5 fig, 3 ref.

Descriptors: Environmental effects, *Temperature, *Hydrogen ion concentration, *Fulvic acids, *Humic acids, Aquatic microbiology, Aquatic environment, Water pollution.

Effects are discussed of temperature and pH on changes in sterile fulvic material obtained from the microbial substrate after different incubation periods and stored under conditions of aerobiosis and darkness. Fulvic acid formation was found to consist of two consecutive processes: condensation of small molecules under conditions of alkaline pH and low temperature followed by a process to which low pH and high temperature were beneficial. The highest percentage of humic matter was found in the longest incubated substrates in an acid environment and at a high temperature. (See also W77-03642) (Chilton-ORNL)
W77-03664

DYNAMIQUE DE DEGRADATION DU PHENOL DANS LE FLEUVE SAINT-LAURENT,
Institut National de la Recherche Scientifique, Rimouski (Quebec).
For primary bibliographic entry see Field 5B.
W77-03665

MICROBIAL DEALINGS WITH HEAVY METALS,
Ottawa Univ., (Ontario). Dept. of Biology.
D. J. Kushner.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p II-59-II-63, 4 tab, 21 ref.

Descriptors: Environmental effects, *Mercury, Resistance, *Bacteria, Path of pollutants, Pollutants, Water pollution effects, Sediments, Fish, Microbiology, Canada, Heavy metals.
Identifiers: *Ottawa River(Canada).

Mercury resistant bacteria from water and sediment and from slime and guts of fish from the Ottawa River were investigated to determine the correlation between mercury resistance and ability to transform mercury compounds. 50% or more of

the bacteria in all compartments were resistant to 1 ppm mercury with 0.2.1% being resistant to 10 ppm of mercury. It was found that, while these bacteria could transform mercury into a volatile compound, there was no evidence for organic mercury formation. (See also W77-03642) (Chilton-ORNL)
W77-03666

MERCURY AND MERCURIAL RESISTANCE DETERMINED BY PLASMIDS IN ESCHERICHIA COLI AND PSEUDOMONAS AERUGINOSA,
Washington Univ., St. Louis, Mo. Dept. of Biology.
J. Schottel, A. Mandal, K. Toth, D. Clark, and S. Silver.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p II-65-II-71, 5 fig, 1 tab, 23 ref.

Descriptors: Environmental effects, *Mercury, Resistance, *Bacteria, *E. coli, Pseudomonas, Water pollution effects.
Identifiers: *Plasmids, *Pseudomonas aeruginosa.

It has been found that mercury and mercurial resistance in bacteria is associated with the presence of extra-chromasomal plasmids. The present study is concerned with these plasmids in E. coli and P. aeruginosa. More than half of the cases studied showed that mercury resistance was associated with the ability to volatilize mercury. The enzyme systems responsible are soluble rather than membrane bound and are produced only after induction of the cells by exposure to any of a variety of mercurials. (See also W77-03642) (Chilton-ORNL)
W77-03667

THE ROLE OF TIN IN BACTERIAL METHYLATION OF MERCURY,
Maryland Univ., College Park. Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W77-03668

TRANSPORT AND DISTRIBUTION OF MERCURY IN SEDIMENTS,
Battelle Columbus Labs., Ohio.
For primary bibliographic entry see Field 5B.
W77-03669

BACTERIAL MOBILIZATION OF MERCURY IN CHESAPEAKE BAY,
Maryland Univ., College Park. Dept. of Microbiology.
R. R. Colwell, and J. D. Nelson, Jr.
In: Proceedings of the Inernational Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p III-1-III-10, 5 fig, 1 tab, 8 ref.

Descriptors: Environmental effects, *Water pollution, Pollutants, *Mercury, *Bacteria, Plankton, Sediments, Water, *Chesapeake Bay, Food chains, Estuaries.

Data showed that the total number of mercury-resistant bacteria in a given sampling site provides an index of microbiological mercury transformation. Larger numbers of mercury resistant populations were found associated with plankton than with water or sediments. In water and sediments mercury-resistant bacteria were found to be distributed non-uniformly between different particle size fractions. It was concluded that bacteria play a major role in the mobilization of mercury in estuaries and coastal waters. Mecury-resistant bacteria take up mercury and pass it on through the food chain. (See also W77-03642) (Chilton-ORNL)
W77-03670

INTERACTION BETWEEN AQUATIC PLANTS AND RIVER BED SEDIMENTS IN THE UPTAKE OF MERCURY FROM FLOWING WATER,
National Research Council of Canada, Ottawa(Ontario). Div. of Biological Sciences.
D. C. Mortimer, and A. Kudo.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p III-11-III-15, 6 fig, 4 tab.

Descriptors: Environmental effects, *Laboratory tests, *Mercury, Chemical reactions, Sediments, Aquatic plants, Running waters, Lotic environment, Water pollution effects.

Aquaria were set up with plants growing in bed sediments and in glass beads in a 24 day controlled, flowing water experiment. Varying concentrations of mercuric chloride and methyl mercuric chloride were continuously metered into the input water to yield aquarium levels of 0.2, 2, and 10 micro g/l. Results showed that there was no significant difference in the uptake rate between mercuric chloride and methyl mercuric chloride and that uptake was proportional to water concentration. Methyl mercury was more toxic to plants than inorganic mercury. Plants growing in sediments absorbed less mercury than those growing in glass beads. The aquarium walls were the largest absorbing compartment in the system with methyl mercury being absorbed more strongly that inorganic mercury. (See also W77-03642) (Chilton-ORNL)
W77-03671

LEAD TRANSPORT IN A RIVER ECOSYSTEM,
Illinois Univ. at Urbana-Champain. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W77-03672

THE FORM OF MERCURY IN FRESHWATER FISH,
Ontario Ministry of the Environment, Toronto. Inorganic Trace Contaminants Lab.
For primary bibliographic entry see Field 5A.
W77-03673

ORIGIN AND FATE OF MERCURY COMPOUNDS IN FISH,
National Research Council of Canada, Ottawa(Ontario). Div. of Biological Sciences.
For primary bibliographic entry see Field 5B.
W77-03674

THE WAYS OF TRANSPORT OF MERCURY TO FISH,
National Swedish Environment Protection Board, Stockholm. Research Lab.
For primary bibliographic entry see Field 5B.
W77-03675

TIME AND SPACE DEPENDENCE OF POLLUTANT LEVELS IN AQUATIC BIOTA, FIELD STUDIES,
Naturhistoriska Riksmuseet, Stockholm (Sweden).
For primary bibliographic entry see Field 5B.
W77-03676

TRENDS OF PCB AND DDT IN FISH AND AQUATIC BIRDS,
Fisheries and Marine Service, St. Andrews (New Brunswick). Biological Station.
For primary bibliographic entry see Field 5B.
W77-03677

MERCURY EFFECTS ON SWIMMING A METABOLISM OF TROUT,
Fisheries and Marine Service, Winni (Manitoba).
D. G. Alexander.
In: Proceedings of the International Confere on Transport of Persistent Chemicals in Aqu Ecosystems held in Ottawa, Canada May 1974. p III-65-III-69, 4 fig, 13 ref.

Descriptors: Environmental effects, *Water po tion effects, *Rainbow trout, *Mercu *Respiration, *Fish behavior, *Metaboli Lethal limit, Toxicity.

Sublethal effects of mercury on rainbow t (Salmo gairdneri) were measured by swimn performance and respiration. Fish were expo for 4-6 days to 0.050, 0.100, 0.144, 0.164 mg of m curic chloride at 15C. Data showed that ac rate, fatigue velocity and scope for acti decreased significantly within the concentra range of 0.050-0.144 mg while the standard rat creased. Fatigue velocity was seen to decrease nificantly with mercury concentrations in the and muscle. (See also W77-03642) (Chil ORNL)
W77-03678

COMPUTER MODELING,
National Research Council of Canada, Otta (Ontario). Div. of Biological Sciences.
For primary bibliographic entry see Field 5B.
W77-03679

ON REALISM AND GENERALITY OF BIO- CUMULATION MODELS. TOWARDS GENERAL METHODOLOGY,
Institute for Water and Air Pollution Resea Stockholm (Sweden).
For primary bibliographic entry see Field 5B.
W77-03680

AQUATIC FOOD CHAIN MODELS FOR ES MATING BIOACCUMULATION A BIODEGRADATION OF XENOBIOTICS,
Fish and Wildlife Service, Columbia, Mo. F Pesticide Research Lab.
B. T. Johnson.
In: Proceedings of the International Confere on Transport of Persistent Chemicals in Aqu Ecosystems held in Ottawa, Canada May 1974. p IV-17-IV-22, 2 tab, 12 ref.

Descriptors: *Model studies, *Mathemat models, Environmental effects, *Food cha *Biodegradation, *Trophic level, DDT, Abs tion.
Identifiers: *Bioaccumulation(Xenobioti *Xenobiotics.

Food chain models were developed to repre three aquatic trophic levels. The models simul temperature and food chain with qualitative quantitative information on uptake, clearing, degradation being available at each sequence the degradation product's movement through chain. Measurements of direct uptake from wa uptake from food, and associated chem changes are used to estimate relative propensity a xenobiotic and possible degradation compou to persist in aquatic ecosystems, as well as to e mate the rate of the materials in the environm An accumulation index was developed which c veys the relative amount of a xenobiotic accu lation in each trophic level of the model. The in is based on DDT as a unity. (See also W77-036 (Chilton-ORNL)
W77-03681

MATHEMATICAL MODELING OF ESTUA AL ECOSYSTEMS,
California Univ., Davis. Dept. of Civil Engine ing.
For primary bibliographic entry see Field 5B.

-03682

OTTAWA RIVER PROJECT,
onal Research Council of Canada, Ottawa
ario). Div. of Biological Sciences.
primary bibliographic entry see Field 5B.
-03683

ECT OF TEMPERATURE ON SEASONAL
AMICS OF THE NUMBER OF FECUNDITY
LEPTODORA KINDTII (FOCKE)
ADOCERA) IN THE REGION OF THE
ATED WATERS OF THE KONAKOVO
TE REGIONAL ELECTRIC POWER
NT, (IN RUSSIAN),
demiya Nauk SSR, Moscow. Institut Biologii
trennykh Vod.
. Kuzichkin.
obiol Zh 11(2), p 71-75, 1975.

criptors: *Thermal pollution, Reservoirs,
tric powerplants, *Crustaceans,
ductivity, *Water temperature, *Heated
r, Seasonal, Water pollution effects.
tifiers: Konakovo, *Leptodora-Kindtii,
SR(Ivankovo Reservoir).

are presented on the seasonal dynamics of
number of Leptodora kindtii in the Ivankovo
ervoir (USSR) in the plume of warm water
harged by the Konakovo state regional electric
er plant on the Volga, the specific fecundity of
henogenetic females, the number of eggs in a
d as a function of water temperature and on
duration of the incubation period as a function
ater temperature. --Copyright 1976, Biological
tracts, Inc.
-03691

COSTS AND EFFECTS OF CHRONIC EX-
URE TO LOW-LEVEL POLLUTANTS IN
ENVIRONMENT,
primary bibliographic entry see Field 6G.
-03701

MATHEMATICAL MODEL FOR WATER
ALITY EVALUATION IN THE SOUTH
ROLINA GRAND STAND,
nson Univ., Dept. of Civil Engineering.
primary bibliographic entry see Field 5B.
-03731

ECTS OF OIL ON THE AMPHIPOD GAM-
RUS OCEANICUS,
dish Water and Air Pollution Research Lab.,
oping. Baltic Sea Lab.
inden.
ironmental Pollution, Vol. 10, No. 4, p. 239-
1976. 7 fig., 21 ref.

criptors: *Oil pollution, *Amphipoda, Marine
nals, Water pollution effects, Growth stages,
tality, Behavior, Growth rates, Oily water, Oil
s, Crustaceans, *Lethal limit, Toxicity.
tifiers: *Sublethal effects, Long-term effects,
ezuela crude oil, Light fuel oil, Heavy fuel oil,
phipod gammarus oceanicus.

eriments with Venezuela crude, light and
y fuel oil on the pre-adult and adult stages of
crustacean, Gammarus oceanicus, indicate
the acute toxic level, under short time expo-
, is several hundred times lower for juveniles
for adults. Heavy fuel oil seems to adhere to
animals, thus inhibiting movement; receptor
and external glandular tissues become
ged, consequently influencing their respiration
feeding. Light fuel oil appears to be chemi-
toxic. Crude oil effects seem to be inter-
iate between those of the light and heavy oils.
g-term effects of low level oil concentrations
0 to 1:60) killed adult test animals within 50-62
. Oil affects animal behavior, as manifested by increased swimming, with a disturbance of the equilibrium, and is equated with an avoidance reaction; reactions to light were also altered. The tendency to enter into the precopula stage is strongly affected, especially by light and heavy fuel oils, and the total number of larvae that hatch from exposed groups was considerably reduced. Growth of newly-hatched larvae is retarded by small amounts of oil. High mortality between the 7th and 12th day is the long-term effect of a single dose of 100 and 300 microliter/liter of crude oil. (Auen-Wisconsin)
W77-03777

SEASONAL AND SHORT-TERM VARIATIONS IN THE CONCENTRATION AND SUPPLY OF DISSOLVED ZINC TO POLLUTED AQUATIC ENVIRONMENT,
University Coll. of Wales, Aberystwyth. Dept. of Geography; and University Coll. of Wales, Aberystwyth. Dept. of Geology.
For primary bibliographic entry see Field 5B.
W77-03778

PRIMARY PRODUCTIVITY OF THE BENTHIC MICROALGAE IN THE CHURCHI SEA NEAR BARROW, ALASKA,
Alaska Univ., College. Inst. of Marine Science.
G. E. M. Matheke, and R. Horner.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A010 694, Price codes: A02 in paper copy, A01 in microfiche. Journal Fisheries Research Board of Canada, Vol. 31, No. 11, p. 1779-1786, 1974. 2 fig., 1 tab., 29 ref.

Descriptors: *Primary productivity, *Cold regions, *Benthic flora, Marine algae, *Alaska, *Euglenophyta, Diatoms, Arctic ocean, Polar regions, Arctic, Seasonal, Eutrophication, Water pollution effects.
Identifiers: *Chukchi Sea, Barrow(Alaska), *Baccilariophycea, Ice algae.

The Bacillariophyceae and Euglenophyceae primary productivity in the Chukchi Sea near Barrow was estimated in situ and compared with the productivity of the phytoplankton and sea ice algae in that ecosystem. Primary productivity for the benthic microalgae was less than 0.5 mg C/sq m/hr. from February until mid-June. Following the disappearance of the ice algae, the benthic microalgae productivity increased to 1.9 mg C/sq m/hr by the end of June and to 20.7 mg C/sq m/hr by mid-July. Much of the increase was due to the growth of an Amphipleura rutilans mat. The highest productivity ranged from 2.4 to 33.0 mg C/sq m/hr. Productivity under the ice from February through the time of the ice algal bloom ranged from 0.0 to 0.6 mg C/sq m/hr. During summer the highest phytoplankton productivity was 17.6 mg C/sq m/hr at one site on August 11th and 23.8 mg C/sq m/hr at another site on August 22nd. The benthic microalga became the most important source of productivity in this nearshore ecosystem after the shorefast ice breakup and the development of the A. rutilans mat. The benthic microalgae productivity was eight times that of the ice algae and twice that of the phytoplankton, and may represent a significant source of primary productivity in that ecosystem. (Auen-Wisconsin)
W77-03782

WATER POLLUTION INVESTIGATION: DETROIT AND ST. CLAIR RIVERS.
Environmental Control Technology Corp., Ann Arbor, Mich.
For primary bibliographic entry see Field 5G.
W77-03783

A COMPENDIUM OF LAKE AND RESERVOIR DATA COLLECTED BY THE NATIONAL EUTROPHICATION SURVEY IN THE NORTHEAST AND NORTHCENTRAL UNITED STATES.
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-248 894, Price codes: A10 in paper copy, A01 in microfiche. Working Paper No. 474, November 1975. 211 p. 1BA029.

Descriptors: *Data collections, *Eutrophication, *Lakes, *Northeast U.S., *Central U.S., Reservoirs, Connecticut, Maine, Massachusetts, Michigan, Minnesota, New Hampshire, New York, Rhode Island, Vermont, Wisconsin, Trophic level, Impoundments.

The trophic level of nearly 200 lakes and impoundments in Connecticut, Maine, Massachusetts, Michigan, Minnesota, New Hampshire, New York, Rhode Island, Vermont and Wisconsin is defined. The trophic condition is based on the following parametric data: (1) Morphometry, including lake type (natural or impoundment), drainage area, surface area, mean depth, total inflow (in cu m/s), and retention time; (2) Physical and chemical characteristics, including median alkalinity and conductivity, mean Secchi disc, median total phosphorus, median dissolved phosphorus, median inorganic nitrogen and median total nitrogen, all in mg/l; (3) Biological characteristics, including mean chlorophyll-a, algal assay control yield (mg/l-dry weight), limiting nutrient and summary of phytoplankton data; (4) Nutrient loading characteristics, including input, municipal, industrial and septic tanks point sources, non-point sources, total loading (kg/yr), lake surface area loading rate (g/sq m/yr), output and retention; and (5) Non-point source nutrient export, including mean flow (cm/s), drainage area (sq km), mean total phosphorus, mean total nitrogen, total phosphorus export, and total nitrogen exports (in kg/sq km yr). Each water body is identified by name, state, principal county, its related trophic condition, STORET number, and NTIS accession number of each related working paper in which data collection procedures are detailed. (Auen-Wisconsin)
W77-03784

ANALYSIS OF SIX BROADBAND OPTICAL FILTERS FOR MEASURING CHLOROPHYLL-A AND SUSPENDED SOLIDS IN THE PATUXENT RIVER,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 5A.
W77-03785

EFFECTS OF PULP MILL EFFLUENT ON PHYTOPLANKTON PRODUCTION IN COASTAL MARINE WATERS OF BRITISH COLUMBIA,
Fisheries and Marine Service, West Vancouver (British Columbia). Pacific Environment Inst.
J. G. Stockner, and D. D. Cliff.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 11, p 2433-2442, November, 1976. 8 fig, 18 ref, 3 tab.

Descriptors: *Pulp wastes, *Phytoplankton, *Water pollution effects, *Canada, *Sea water, Industrial wastes, Water pollution sources, Aquatic life, Marine life, Plankton, Effluents, Pulp and paper industry, Aquatic microorganisms, Chlorophyll, Toxicity, Hydrogen ion concentration.
Identifiers: *Howe Sound(British Columbia), Kraft mills, Skeletonema costatum, Thalassiosira.

Phytoplankton production adjacent to two kraft pulp mills in Howe Sound, British Columbia, was considerably lower than daily rates at control stations removed from the zone of influence. Average daily production at the Port Mellon mill was 29 and 24 mg C/sq m/day in 1973 and 1974, in

contrast with 332 and 367, in respective years at the control. Less difference in production was seen between the Woodfibre mill and its control, because this mill is situated in a more actively flushed location. Howe Sound studies showed little qualitative or quantitative difference between chlorophyll 'a' levels or phytoplankton assemblages among mill and control stations. Skeletonema costatum and Thalassiosira spp. were dominant phytoplankton species. Light attenuation and selective absorption of 400-500 nm wavelength light by kraft mill effluent was considered the major responsible for reduced production in the zone of influence. Axenic culture studies with marine phytoplankton showed that phytoplankicity occurs only at high effluent concentrations. Laboratory experiments suggest that, given sufficient time, it is possible for phytoplankton to adapt to relatively high effluent concentrations, if pH remains normal. (Witt-IPC)
W77-03797

MARINE PHYTOPLANKTON GROWTH IN HIGH CONCENTRATIONS OF PULP MILL EFFLUENT,
Fisheries and Marine Service, West Vancouver (British Columbia). Pacific Environment Inst.
J. G. Stockner, and A. C. Costella.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 12, p 2758-2765, December, 1976. 3 fig, 9 ref, 3 tab.

Descriptors: *Pulp wastes, *Phytoplankton, *Water pollution effects, Wastes, Water pollution sources, Aquatic life, Marine life, Plankton, Effluents, Pulp and paper industry, Aquatic microorganisms, Industrial wastes.
Identifiers: Kraft mills, Newsprint mills, Skeletonema costatum, Dunaliella tertiolecta, Amphidinium carteri.

Axenic culture studies with the marine phytoplankton Skeletonema costatum, Dunaliella tertiolecta, and Amphidinium carteri demonstrated the ability of these species to adapt to and exhibit normal growth in relatively high concentrations of pulp mill effluent. Skeletonema costatum and A. carteri required a preadaptation period prior to commencement of exponential growth in high concentrations of kraft effluent (20-30%), while D. tertiolecta exponential growth in 90% kraft effluent with no requirement for preadaptation. Of six pulp mill effluent types tested, kraft was considered most inhibitory to growth, while combined kraft and newsprint effluent passed through an XAD-8 resin column was least inhibitory. The effects of the six effluent types on lag, exponential, and stationary growth phases are discussed in relation to in situ concentrations and relative ecological significance in the coastal marine environment. (Witt-IPC)
W77-03798

AQUEOUS LEACHATE FROM WESTERN RED CEDAR: EFFECTS ON SOME AQUATIC ORGANISMS,
Washington Univ., Seattle, Coll. of Fisheries.
G. B. Peters, H. J. Dawson, B. F. Hrutfiord, and R. R. Whitney.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 12, p 2703-2709, December, 1976. 5 fig, 13 ref, 2 tab.

Descriptors: *Water pollution effects, *Aquatic life, *Toxicity, Salmon, Aquatic animals, Water pollution sources, Water pollution, Leachate, Landfills, Lumbering, Wood wastes, Mortality, Fish, Salmonids, Bark, Organic compounds, Bioassay, Pollutant identification.
Identifiers: *Wood extractives, *Western redcedar(Thuja plicata), Coho salmon(Oncorhynchus kisutch), Lignans, Terpenes, Tropolones.

Water-soluble extractives from western red-cedar (Thuja plicata) heartwood, bark and foliage were investigated for their toxicity to aquatic organisms. The heartwood lignans and bark extractives were found to be moderately toxic, but the foliage terpenes and heartwood tropolones were more toxic, causing 50% mortality to coho salmon (Oncorhynchus kisutch) fry at 0.33 and 2.7 mg/liter, respectively. Tropolones were significantly less toxic to invertebrates than to free-swimming stages of the fish tested. Fry were found to be the stage of development of coho salmon most sensitive to tropolones, and eyed eggs the least sensitive. Sensitivity of the coho fry to tropolones was moderated by previous sublethal exposure or the presence of a chelatable cation. Results from field studies and a leaching study indicate that directly releasing cedar leachate from landfills or allowing logging debris to enter streams should be avoided. (Witt-IPC)
W77-03799

EUTROPHICATION AND FISH TOXICITY POTENTIALS IN A MULTIPLE-USE SUBTROPICAL RESERVOIR,
Hawaii Univ., Honolulu. Water Resources Research Center.
R. H. F. Young, G. L. Dugan, L. Lau, and H. Yamauchi.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 089, Price codes: A09 in paper copy, A01 in microfiche. Technical Report No. 89, July 1975. 175 p, 61 fig, 41 tab, 72 ref, 2 append.

Descriptors: *Sewage effluents, Water quality, *Sediments, Bioassay, Low flow, Phosphorus, *Hawaii, Nitrogen, Waste water treatment, Sewage treatment, *Eutrophication, Waste disposal, *Toxicity, Reservoirs.
Identifiers: *Algal growth potential, *Wahiawa Reservoir(HI), Wahiawa Sewage Treatment Plant, Whitmore Village Sewage Treatment Plant, Ku Tree Reservoir, Oahu.

The impact of secondary-treated effluents from the Wahiawa and Whitmore Sewage Treatment Plants on the Wahiawa Reservoir, Oahu, was investigated in terms of water and sediment quality, algal growth potential, and fish toxicity. Reservoir and waste water management alternatives were investigated based on these environmental inputs and preliminary estimates of costs and benefits of the alternatives. Nitrogen and phosphorus resulting from the discharges were determined to be responsible for seasonal stresses on both the water quality and fishes. The two most feasible alternatives for improving the situation were reuse of secondary effluent for sugarcane irrigation and seasonal tertiary waste water treatment with the latter being the more favored of the two.
W77-03825

THE DECOMPOSITION OF LEAVES IN TWO SOUTHERN CALIFORNIA STREAMS,
California Univ., Santa Barbara. Dept. of Biological Sciences.
For primary bibliographic entry see Field 5B.
W77-03829

CONCENTRATION OF ORGANIC SUBSTANCES IN WATER AS A FACTOR CONTROLLING THE OCCURRENCE OF SOME CILIATE SPECIES,
Ceskoslovenska Akademie Ved, Prague. Hydrobiologicka Laborator.
M. Legner.
Int Rev Gesamten Hydrobiol 60(5), p 639-654, 1975.

Descriptors: *Ciliates, *Organic wastes, Organic compounds, *Organic matter, Reservoirs, Rivers, Industrial wastes, Water pollution effects.
Identifiers: *Glucose, *Peptone.

A description of 7 experiments on the development of ciliate populations in samples from a river and 2 reservoirs is given. The samples were alternatively supplemented by various amounts of
ganic material and incubated at 20C. The succ
sion of ciliate species was followed for 1-4 v
Different initial concentrations of the same
ganic material promoted the development of d
ferent species. After the addition of small amou
of organics the species sequence varied co
siderably; the addition of larger amounts was f
lowed by higher individual counts and a fai
reproducible species sequence. When the usua
dominant species were not present in the ino
lum, the respective period passed without
presence of any ciliates. The sequence of the s
cies was almost identical in the parts of the sa
sample supplemented by either glucose or p
tone.--Copyright 1976, Biological Abstracts, Inc
W77-03839

**WATERFOWL AND ACID PRECIPITATION
NORWAY, (IN DANISH),**
Zoologisk Museum, Oslo (Norway).
H. M. K. Lund.
Fauna (OSLO) 28(4), p 224-225, 1975.

Descriptors: *Waterfowl, Fish, Invertebrat
Water pollution, *Air pollution, Forests, Precipi
tion(Atmospheric), Zinc, Lead, Sulfur co
pounds, Industrial wastes.
Identifiers: *Acid precipitation, *Norway.

The precipitation over Scandinavia during the l
few decades has brought increasing amounts
airborne pollutants, SO2, Zn and Pb, from ind
trial areas in western and central Europe. The
contaminants have killed fish and invertebrates
mountain lakes in S. Norway. In 1972 the Nor
gian Ministry of Environment started a resear
project concerning the effect of this 'ac
precipitation on forests and fish. Includi
Tetraonidae in the project is being considered. T
consequences of the acidification of lakes a
rivers on waterfowl should be included in the p
ject.--Copyright 1976, Biological Abstracts, Inc.
W77-03841

**EFFECT OF VARIOUS FACTORS ON GL
COSE DECOMPOSITION RATE IN NATUR
WATERS, (IN RUSSIAN),**
Akademiya Nauk URSR, Kiev. Instyt
Hidrobiologii.
B. I. Nabivanets, I. G. Garasevich, and V. I.
Kachan.
Gidrobiol Zh 11(4), p 17-25, 1975.

Descriptors: Water pollution effects, *Dissolv
oxygen, *Degradation(Decomposition), Sal
Decomposing organic matter, Microorganisms.
Identifiers: *Glucose, Heterotrophic organisms.

The amount of O2 dissolved in water (1.5-9 mg
has no influence on the rate of glucose disa
pearance and only its complete absence results
3-fold growth of the rate constant. Introduction
great amounts of biogens into the water produce
5-10 fold growth in the reaction rate constant a
an increase in concentration of dissolved sa
yields only a 1.5-2-fold increase in the consta
The number of heterotrophic organisms has a de
sive influence on the process rate; the consta
value is proportional to their number at the start
the experiment.--Copyright 1976, Biological A
stracts, Inc.
W77-03862

**THE EFFECTS OF FRESHWATER INFLOW
ON HYDROLOGICAL AND BIOLOGICA
PARAMETERS IN THE SAN ANTONIO BA
SYSTEM, TEXAS,**
Texas Parks and Wildlife Dept., Austin. Coast
Fisheries Branch.
For primary bibliographic entry see Field 2L.
W77-03897

ZERO-RELATIVE-VELOCITY BELT IMMER,
ell Development Co., Houston, Tex. Pipelne search and Development Lab.
R. Ayers, K. L. Bickham, J. Fraser, and P. E. us.
ailable from the National Technical Informa- n Service, Springfield, VA 22161 as AD/A-014 , Price codes: A11 in paper copy, A01 in crofiche. U. S. Costal Guard Office of Research l Development, Report No. CG-D-116-75, April 5. 246 p, 9 ref, 6 append. DOT-CG-42229-A.

scriptors: *Oil spills,l *Oil pollution, *Water lution control, Equipment, *Skimming, Pollu- n abatement, *Separation techniques.
ntifiers: Oil recovery systems, Belt skimmers.

easibility study was conducted on a zero rela- e velocity (ZRV) belt skimming concept for use currents up to 10 knots. Conclusions from the dy follow: The feasibility studies indicate that ther development of hardware is warranted by protected oil collection performance. A com- ite belt of Astroturf and Fuetron felt can idly sorb oils having viscosities ranging from t diesel to No. 6 fuel oil. The composite belt, sely drapped on the water's surface for 40 to 50 t of contact length, can imbibe and withdraw ge quantities of oil under ZRV conditions at 10 ts. Oil is extracted from the belt by mechanical nging. Tests of full scale simulations of the belt l wringer action show maximum oil recovery es between 1016 gpm and 2152 pgm for an eight- t-wide belt at a speed of 6.8 knots. Debris does appreciably affect the ZRV belt skimmer ause most of it will pass ulnder the belt. The ef- ts of waves on performance are minimized ause the sorbent belt is compliant. (Sinha- IS)
7-03899

ALYSIS OF POLLUTION FROM MARINE GINES AND EFFECTS ON THE ENVIRON- NT. SOUTHERN LAKES,
vironmental Science and Engineering, Inc., inesville, Fla.
L. Davis, and K. D. Wilson.
ailable from the National Technical Informa- n Service, Springfield, VA 22161 as PB-242 176, ce codes: A11 in paper copy, A01 in microfiche. vironmental Protection Agency, Environmental otection Technology Series, No. EPA-670/2-75- , June 1975. 242 p, 14 fig, 57 tab, 58 ref. R- 799.

scriptors: *Florida, *Water pollution effects, il pollution, *Biological communities, *Water ality, *Environmental effects, *Baseline stu- s, Monitoring, Benthos, Aquatic plants, osystems, Grasses, Lead, Fishes.
ntifiers: Leaded fuel Marine engines, Outboard tor emissions.

e effects of two-cycle outboard engine emission Florida lakes using leaded fuel and drained and inless engines were studied. Field investiga- ns were performed in three natural lakes of 2 to acres near Gainesville, Florida. One lake was ated with 'drainless' engines and one with en- es which 'drained' unburned fuel into the ter. The third lake served as a control. Biologi- components and water quality conditions in the ee lakes were monitored by routine standard cedures for a time period of 18 months during ich motors were operated at the rate of 2.4 gal- s of fuel per million gallons of water per day. ring the course of the field investigation, there s no overt evidence of any significant effect of tor emissions on the benthic macroinver- rates, phytoplankton, periphyton, and fish e; although the data indicated that plant duction in the grassbeds may have increased as sult of engine operation. This increase in plant duction was evident during the growing season en the availability of carbon dioxide limited nt growth in the grassbed community. (Sinha- IS)

W77-03900

EFFECTS OF SUSPENDED AND DEPOSITED SEDIMENTS ON ESTUARINE ORGANISMS - PHASE II,
Maryland Univ., Solomons. Natural Resources Inst.
J. A. Sherk, J. M. O'Connor, D. A. Neumann, R. D. Prince, and K. V. Wood.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A011 372, Price codes: A13 in paper copy, A01 in microfiche. Reference No. 74-20, March 1974. 296 p, 44 fig, 30 tab, 7 ref. DACW72-71-C-0003.

Descriptors: *Maryland, *Water pollution effects, *Estuaries, *Biological communities, *Baseline studies, *Environmental effects, *Bioassays, *Suspended solids, *Estuarine fisheries, *Kaolinite, Analytical techniques, Toxicity, Sediments, Edology.
Identifiers: Lethal effects, Sublethal effects, Fuller's earth, Patuxent River, Delaware Bay.

A three-year laboratory study identified biological components of selected populations of estuarine organisms which were most sensitive to the effects of particle size and concentration of (1) suspended mineral solids similar in size to sediments likely to be found in, or added to, estuarine systems in concentrations typically found during flooding, dredging, and disposal of dredged material, and (2) natural sediments in identical experiments. Generally, bottom-dwelling fish species were most tolerant to suspended solids; filter feeders were most sensitive. Early life stages were more sensitive to suspended solids than adults. Bioassays with natural sediments indicated that suspensions of natural muds affect fishes in the same way as fuller's earth, but higher concentrations of natural material were required to produce the same level of response. Sublethal solids effects on fishes were identified: hematological compensation for reduction in gas exchange across the gill surface, abrasion of the body epithelium, packing of the gut with large quantities of ingested solids, disruption of gill tissue, increased activity, and reduction in stored metabolic reserves. With adequate knowledge of local conditions (life history stages, sediment types, sediment concentrations, seasonal and resident species, duration of exposure, and habitat preference) at estuarine sites selected for environmental modification, our efforts provide baseline data for pre-project decision making based upon concentration effects of different types of suspended sediments. (See also W71-11045) (Sinha-OEIS)
W77-03901

COASTAL MARINE POLLUTION AND FISH,
Fisheries and Marine Service, West Vancouver (British Columbia). Pacific Environment Inst.
M. Waldichuk.
Ocean Management, Vol 2, p 1-60, 1974. 7 tab, 110 ref.

Descriptors: *Waste disposal, *Radionuclides, *Oil pollution, *Toxicity, *Ecosystems, *Biological communities, *Water quality, *Environmental effects, *Water pollution effects, *Pesticides, *Thermal pollution, Coasts, Fish, Shellfish, Domestic wastes, Industrial wastes, Sewage disposal, Pulp wastes, Runoff.
Identifiers: *Outer Continental Shelf, *Coastal zone, Sublethal effects, Mining wastes.

An effort is made to explore the various effects of man, particularly in his disposal of waste into the marine environment, on various fish stocks the world over. Because fish are dependent on lower forms in the food chain for nourishment, and because many of these lower forms constitute a seafood resource for man, they are considered along with the fin-fish as sea life affected by pollutants. Since most pollution originates from continents, the discussion deals mainly with coastal pollution. It is in the coastal zone that the critical problems of the marine environment exist. Moreover, it is estimated that over 90% of the world's fish catch comes from 10% of the world oceans, i.e., the continental shelf and upwelling regions where pollution may be most severe. The remaining 90% of the oceans is a biological desert. Emphasis is placed on fish species along the coast of North America. While there is clear-cut evidence of the harmful effect of pollution on fish stocks in some areas, where some of these fish have been destroyed by acute poisoning or by unfavorable conditions created in the aquatic environment, there are too many cause-effect relationships which must still be speculated upon. (Sinha-OEIS)
W77-03902

EFFECTS OF WASTE WATER ON ESTUARINE ECOSYSTEMS,
Maryland Univ., Solomons. Chesapeake Biological Lab.
D. A. Flemer, and D. R. Heinle.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-241 003, Price codes: A03 in paper copy, A01 in microfiche. Chesapeake Research Consortium, Inc., CRC Publication No. 33 and Maryland University, Natural Resources Institute Ref. No. 74-79 Report to National Science Foundation (RANN), June 1974. 16 p, 15 fig, 1 tab, 11 ref.

Descriptors: *Estuarine environment, *Wastes, *Ecosystems, *Sewage treatment, *Biomass, *Baseline studies, *Environmental effects, Water resources, Algae, Nutrients, Water pollution effects, Chesapeake Bay, Maryland, Continental shelf.
Identifiers: *Patuxent River(Md).

Recent increases in algae, measured as concentration of chlorophyll a, in the Patuxent River estuary appear to have occurred as a consequence of increased loading by sewage in the upper watershed. The increases in concentration of chlorophyll were observed downstream from the turbid sediment-trap portion of the estuary, an impact distant from the points of addition. Primary production, measures by the 14C method, increased also as did zooplankton biomass. Samples of water from the Sandy Point area of the upper Chesapeake Bay were enclosed in 750-liter (200-gallon) polyethylene microcosms, enriched with treated sewage, and ensuing events followed. While the predictions from the microcosms have not been fully validated, clear effects on several parameters were noted. Phosphate appeared to be the major limiting nutrient in these experiments. Enriched microcosms developed higher concentrations of zooplankton and chlorophyll a and rates of primary production, permitting predictions of effects of the sewage treatment plant under various loads. (Sinha-OEIS)
W77-03914

AN ENVIRONMENTAL SURVEY OF EFFECTS OF DREDGING AND SPOIL DISPOSAL, NEW LONDON, CONNECTICUT. 1ST QUARTERLY REPORT.
National Marine Fisheries Service, Highlands, N.J. Middle Atlantic Coastal Fisheries Center.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A014 592, Price codes: A05 in paper copy, A01 in microfiche. Informal Report No 40 to Naval Facilities Engineering Command, Philadelphia, Penn., November 1974. 85 p, 4 append.

Descriptors: *Dredging, *Spoil banks, *Environmental effects, *Baseline studies, *Biological communities, *Connecticut, Monitoring, Sediments, Benthos, Resources development, Heavy metals, Ocean currents, Ecosystems.
Identifiers: Outer Continental Shelf, *Thames River(Conn), Spoil disposal, Ocean dumping.

The activities and findings of the several integrated research projects designed to monitor the environmental effects of dredging in the Thames River and dredge spoil disposal at the New London Dumping Ground are reported. Studies of the principal contracting agency, the Middle Atlantic Coastal Fisheries Center (MACFC) of the National Marine Fisheries Service (NMFS) from 24 June through 1 November 1974 as well as activities of the subcontractors, the University of Connecticut (UCONN) and the New York Ocean Science Laboratory (NYSOL) are discussed. Surveys to establish baseline values for environmental conditions were completed by all parties prior to the August onset of dredging. UCONN charted predredging temperature, salinity, suspended solids and light transmission characteristics in the Lower Thames. NYOSL conduted three predump surveys of the spoiling area to measure currents and movement of surface and bottom water masses and to determine baseline water column values. MACFC collected and processed dredging and spoiling samples from both river and dump sites. (Sinha-OEIS)
W77-03917

AN ENVIRONMENTAL SURVEY OF EFFECTS OF DREDGING AND SPOIL DISPOSAL, NEW LONDON, CONNECTICUT. 2ND QUARTERLY REPORT.
National Marine Fisheries Service, Highlands, N.J. Middle Atlantic Coastal Fisheries Center.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A014 595, Price codes: A07 in paper copy, A01 in microfiche. Informal Report No. 49 to Naval Facilities Engineering Command, Philadelphia, Penn., February 1975. 133 p, 5 append.

Descriptors: *Dredging, *Environmental effects, *Heavy metals, *Baseline studies, *Spoil banks, Resources development, *Biological communities, *Connecticut, Monitoring, Sediments, Benthos, Ocean currents, Ecosystems.
Identifiers: Outer Continental Shelf, *Spoil disposal, Ocean dumping, *Thames River(Conn).

The activities and findings of the several integrated research projects designed to monitor the environmental effects of dredging in the Thames River and dredge spoil disposal at the New London Dumping Ground are reported. Progress has been made toward selecting a circulation model for determining dredging-induced variations, and toward characterizing average loads of suspended sediments during autumn. The University of Connecticut report contains photographic documentation of the nature of spoils at the dump site and evidence of past dumping. SCUBA surveys conducted in late November and early December found no outstanding changes in bottom conditions. The New York Ocean Science Laboratory (NYSOL) reports establish predisposal values for the physical and chemical oceanography of the dump site, and describe changes found in September and December as well as effects of single dumping events at those times. The report also presents predisposal concentrations of heavy metals in benthic animals. MACFC's benthic macrofauna studies have shown little change in community characteristics between July and October (outside of the dumping point itself, where October samples consisted of spoil material practically devoid of life). The report includes a tentative schedule of field activities for all investigations through 1975.
W77-03918

AN ENVIRONMENTAL SURVEY OF EFFECTS OF DREDGING AND SPOIL DISPOSAL, NEW LONDON, CONNECTICUT. 3RD QUARTERLY REPORT.
National Marine Fisheries Service, Highlands, N.J. Middle Atlantic Coastal Fisheries Center.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A014 596, Price codes: A07 in paper copy, A01 in microfiche. Informal Report No 62, to Naval Facilities Engineering Command, Philadelphia, Penn., May 1975. 136 p, 6 append.

Descriptors: *Connecticut, *Dredging, *Spoil banks, *Biological communities, *Environmental effects, *Resources development, *Baseline studies, Sediments, Benthos, Ocean currents, Ecosystems.
Identifiers: *Outer Continental Shelf, *Spoil disposal, *Thames River(Conn).

The activities and findings of the several integrated research projects designed to monitor the environmental effects of dredging in the Thames River and dredge spoil disposal at the New London Dumping Ground are reported. Field activities and findings to date are presented, with emphasis on studies conducted between 1 January and 31 March 1975. The University of Connecticut (UCONN) conducted two additional surveys of hydrography in the Thames River, and reported on an intensive survey carried out in November 1974 in the vicinity of the dredging operation. The New York Ocean Science Laboratory (NYSOL) occupied the dump site for physical and chemical measurements on 28 February and 6 March 1975. Current speeds, directions and durations for both dates are presented, along with returns to date from a drifter study. Predredging densities of fecal coliform bacteria are reported, showing highest counts in the river but also elevated numbers at many disposal area stations. The overall study has uncovered no gross effects of the dredging and spoiling outside of the immediate vicinity of these activities. (Sinha-OEIS)
W77-03919

PROCEEDINGS FOR SECOND ANNUAL CONFERENCE ON THE RESTORATION OF COASTAL VEGETATION IN FLORIDA.
Hillsborough Community Coll., Tampa, Fla.
For primary bibliographic entry see Field 5G.
W77-03942

PATTERNS OF SECONDARY SUCCESSION IN A MANGROVE COMMUNITY, TAMPA BAY, FLORIDA,
East Stroudsburg State Coll., Pa. Dept. of Biology.
For primary bibliographic entry see Field 5G.
W77-03947

THE POSSIBLE ROLE OF SPARTINA ALTERNIFLORA LOISEL IN ESTABLISHMENT OF MANGROVES IN FLORIDA,
Hillsborough Community Coll., Tampa, Fla. Dept. of Biology.
For primary bibliographic entry see Field 5G.
W77-03948

EFFORTS IN MARINE REVEGETATION IN ARTIFICIAL HABITATS,
Marco Applied Marine Ecology Station, Marco Island, Fla.
For primary bibliographic entry see Field 5G.
W77-03949

ASPECTS OF RED MANGROVE REFORESTATION IN FLORIDA,
Florida Inst. of Tech., Jensen Beach. Environmental Studies.
For primary bibliographic entry see Field 5G.
W77-03950

SUGGESTED MANGROVE TRANSPLANTING TECHNIQUES,
Florida Dept. of Natural Resources, St. Petersburg. Marine Research Lab.
For primary bibliographic entry see Field 5G.
W77-03951

PLANTINGS OF RED MANGRO (RHIZOPHORA MANGLE L.) IN CHARLOT AND ST. LUCIE COUNTIES, FLORIDA,
Miami Univ., Coral Gables. Dept. of Biology.
For primary bibliographic entry see Field 5G.
W77-03952

PRODUCTION DYNAMICS OF ALLOPER MEDIANA BAN (PLECOPTERA:CHLOROPERLIDAE) A DIPLECTRONA MODESTA BAN (TRICHOPTERA:HYDROPSYCHIDAE) WALKER BRANCH, TENNESSEE,
Oak Ridge National Lab. Tenn. Environme Sciences Div.
R. M. Cushman, J. W. Elwood, and S. G. Hildebrand.
Report No. ORNL-TM-4957 (Environme Sciences Division Publication No. 785), Octo 1975. 77 p. 14 fig., 8 tab., 75 ref.W-7504-eng-26.

Descriptors: *Fecundity, *Productivity, *Strea *Insects, *Stoneflies, *Caddisflies, *Tennes Life cycles, Growth rates, Larvae, Population.
Identifiers: Alloperla mediana, Diplectr modesta, *Walker Branch(Tenn).

Results of a study to estimate production of caddisfly and stonefly species and to relate t production to stream ecology are presented. loperla mediana had a two-year life cycle and extended hatching period, with a new col beginning each December and newly-hatched dividuals appearing through the following M Diplectrona modesta had two overlapping gen tions, each with a one-year life cycle. Produc rates were calculated using the Hynes, remo summation, instantaneous growth, and 'A curve' methods. Estimates of total annual proc tion rates of A. mediana and D. modesta, using four methods, ranged from 97.9 to 152.9 mg m/yr and from 564.6 to 1150.8 mg sq m/yr, resp tively. The lowest estimate for each species obtained with the 'Allen curve' method and highest estimate was obtained with the remo summation method. Most of the production o modesta was from the summer genera (summer adult flight), with a lesser amount c tributed by the spring generation (spring a flight). Error sources in the production estim are discussed. Maximum growth and la production of these insects were related seasonal inputs of terrestrial leaves. Poss ecological adaptations by the life histories of two species are mentioned. (Auen-Wisconsin)
W77-03953

A REPORT ON THE METHYLMERCU SITUATION IN PAR POND,
Georgia Univ., Athens. Dept. of Zoology.
For primary bibliographic entry see Field 5B.
W77-03954

TECHNICAL AND MICROECONOMIC ANA SIS OF CADMIUM AND ITS COMPOUNDS,
Versar, Inc., Springfield, Va.
For primary bibliographic entry see Field 5B.
W77-03963

PRIMARY PRODUCTIVITY AND MINER CYCLING IN AQUATIC MACROPHYTE CO MUNITIES OF THE CHOWAN RIVER, NOR CAROLINA,
East Carolina Univ., Greenville. Dept. of Biolo
M. M. Brinson, and G. J. Davis.
Available from the National Technical Infor tion Service, Springfield, VA 22161 as PB-263 Price codes: A08 in paper copy, A01 in microfi
Water Resources Research Institute of the Uni sity of North Carolina, Raleigh, UNC-WRRI port No 120, September 1976. 137 p, 23 fig, 26 138 ref. OWRT B-079-NC(4), 14-31-0001-5098.

criptors: *Rooted aquatic plants, Aquatic
ts, *Aquatic weeds, *Plant growth, Aquatic
uctivity, *Cycling nutrients, Chemical analy-
Nutrient removal, *North Carolina, Rivers,
nary productivity, Water quality.
tifiers: *Chowan River(NC), *Aquatic
rophytes, *Yellow water lily, *Mineral
ng, *Water willow.

aquatic macrophyte communities of the lower
wan River are dominated by the yellow water
Nuphar luteum) and the water willow (Justicia
icana). Aerial surveys (370 m altitude) made
974-75 by means of overlapping photography
ne shoreline revealed about 27 hectares of
tic macrophyte stands in a 52 km sector of the
north of Albemarle Sound. An estimated 99
ent of the coverage was by Nuphar. Peak
ass of Nuphar ranged between 115 and 300
s dry weight per square meter at three sites
net primary productivity was estimated at 222
s dry weight per square meter per year based
rnover rate of leaves and growth increments
izomes and roots. About 77 percent of the
har biomass was in the sediments (roots and
mes) while 92 percent of the annual net pri-
productivity occurred in above-ground struc-
(leaves, petioles, and reproductive parts). A
isotope technique was employed to trace
ectional movement of phosphorus in Nuphar.
ard translocation followed root absorption
downward translocation followed submersed
absorption of phosphorus. Aquatic
rophytes are unlikely to affect the water quali-
d other uses of the lower Chowan River if
nt conditions prevail. Because of the
icted area of the shallow littoral, it is doubtful
aquatic macrophytes will have a significant
ct on the productivity or nutrient status of the
system in the future. (Stewart-North
lina State)
-03969

**RENT PROBLEMS OF HYGIENIC STAN-
DIZATION OF NEW CHEMICAL SUB-
NCES, (IN RUSSIAN),**
kovskii Gosudarstvennyi Meditsinskii Institut
SSR).
Rumyantsev, and S. M. Novikov.
Sanit 8, p 76-79, 1975.

riptors: Public health, Industrial wastes,
mical wastes, Metabolism, *Toxicity, *Water
ty standards, Water pollution effects, Water
tion sources.

e current stage of development of hygienic
ce much attention is being devoted to an
ation of the hazard of chemical substances in
ase of their simultaneous intake into the
n organism with air, water and food
icts. In industrial toxicology it is important to
op principles of hygienic standardization
r conditions of the combined effect of chemi-
ubstances and the combined effect of physical
chemical factors of the industrial environ-
, with consideration of the characteristics of
body's reaction to the combined intake of
ns via the respiratory organs and skin. The
on of these problems will depend in many
cts on a study of the absorption, distribution,
bolism and excretion of foreign substances
ing the body by various routes, character of
oxic effect and dynamics of the pathological
ss in comparison with the chemical structure
ontent of industrial poisons in the body, etc.--
right 1976, Biological Abstracts, Inc.
04015

**TRANSPORT IN A LAKE TAHOE TRIBU-
Y AND ITS POTENTIAL INFLUENCE
N PHYTOPLANKTON GROWTH,**
rnia Univ., Richmond. Sanitary Engineering
rch Lab.
rimary bibliographic entry see Field 5B.
04022

CONCENTRATION OF POLYVALENT METALS BY SEAWEEDS IN VOSTOK BAY, SEA OF JAPAN,
Akademiya Nauk SSSR, Vladivostok.
G. H. Saenko, and M. D. Koryakova.
Marine Biology, Vol. 34, 1976, p. 169-176, 3 tab., 36 ref.

Descriptors: Metals, Sea water, Marne algae, Marine plants, Titanium, Vanadium, Manganese, Iron, Nicke. Copper, Zinc, Molybdenum, Chromium, Cobalt, Path of pollutants.
Identifiers: Ptilota filicina, Fhodomela larix, Acquarum cribrosum, Ulvaria splendens, Ulva fenestrata, Enteromorpha prolifera, Codium yessoenis, Zostera asiatica, Phyllospadix awatenis, Sea of Japan, Vostok Bay.

Spectrophotometric methods were used to measure the contents of the polyvalent metals Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Mo and Zn in 16 species of red, brown and green seaweeds and 2 species of higher water plants collected from the intertidol and sublittoral zones of Vostok Bay, Sea of Japan, Some of the species displayed a unique capability for increased accumulation of groups of several metals. We have termed this ability specific group concentration. Thus, Ptilota filicina concentrates Ti, V, Mn, Fe, Ni, Cu, Zn, and Mo; Polysiphonia japonica Ti, V, Mn, Fe, Zn, Mo, and Cr; Rhodomela larix Ti, V, Mn, Fe, Ni, Zn, and Cr; Agarum cribrosum Ti, V, Mn, Fe, Ni, Zn, and Cr; Ulvaria splendens Ti, V, Mn, Fe, Ni, and Cu; Ulva fenestrata Mn, Fe, Ni, and Cu; Enteromorpha prolifera Mn, Co, Zn, Mo, and Cr; Codium yessoenis V, Mn, Fe, Zn, and Cr; Zostera asiatica Ti, Mn, Ni, and Mo; Phyllospadix iwatensis Ti, V, Mn, Fe, and Zn. (Katz)
W77-04023

AQUATIC ORGANISMS RESPONSE TO SEVERE STRESS FOLLOWING ACUTELY SUBLETHAL TOXICANT EXPOSURE,
Virginian Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.
J. Cairns, Jr., W. F. Calhoun, M. J. McGinniss, and W. Straka.

Descriptors: Bioassay, Mortalities, Fish, *Snails, Laboratory tests, Laboratory animals, *Brown trout, *Thermal stress, *Thermal pollution, Zinc, Benthic fauna, Stress, *Lethal limit, Phenols, Lampreys.
Identifiers: Goniobasis livescens, p-nitrophenol, Lampricides, 3-trifluoromethyl-r-nitrophenol, TFM, Thermal shock.

Snails, Goniobasis livescens (Menke) were exposed to acutely sublethal concentrations of p-nitrophenol and the lampricide, 3-trifluoromethyl-4-mitrophenol (TFM), and then to acutely lethal thermal shocks. The same species were also exposed to acutely sublethal concentrations of zinc followed by exposure to acutely lethal concentrations of p-nitrophenol; and to acutely sublethal concentrations of TFM followed by exposure to acutely lethal concetrations of zinc. Brown trout, Salmo trutta, were exposed to acutely sublethal concentrations of TFM and then to an acutely lethal thermal shock. Results of these experiments indicate that prior exposure to acutely sublethal toxicant concentrations may reduce survival time for a subsequent exposure to acutely lethal concentrations of a second toxicant (e.g., snails exposed to Zn++then p-nitrophenol) but neither prior or concomitant exposure to acutely sublethal toxicant concentrations insures that the median survival time for a lethal exposure will be significantly altered (e.g. snails to 0.2 x 48 hr LC50 for TFM then Zn++). However, some acutely sublethal concentrations of a toxicant may significantly alter survival time of snails to a lethal concentration of a different toxicant (e.g. exposure to 0.4 x 48 hour LC50 TFM then a lethal doze of Zn++). The brown trout exposed to an acutely sublethal concentration of TFM and then an acutely lethal thermal shock did have significantly altered survival patterns. (Katz)
W77-04024

UPTAKE AND RETENTION OF KUWAIT CRUDE OIL AND ITS EFFECTS ON OXYGEN UPTAKE BY THE SOFT-SHELL CLAM, MYA ARENARIA,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia).
W. C. Fong.
Journal of the Fisheries Research Board of Canada, Vol. 33 (1976), p. 2774-2780, 2 tab., 3 fig., 26 ref.

Descriptors: Oil, *Oil pollution, Oily water, Water pollution effects, *Clams, Benthos, Marine animals, Molluscs, Bioassay, Physiological ecology, Path of pollutants, Pathology, Oxygen, Oxygen requirements, Biochemistry, Lipids, *Absorption, Respiration.
Identifiers: *Soft shell clam, Gills, *Kuwait Crude oil, Tissue lipids, Tissue concentration.

Mya arenaria gills are capable of removing finely dispersed oil globules of 1-30 micro/m diam from sea water along with food particles. Clams exposed to seawater concentrations of 90-380 micro/g oil/liter for 10 days at 18C accumulated oil in their tissues. Concentrations incorporated are directly related to the lipid content of tissues. Approximately 6 mg oil/g lipid was observed within the tissue of individual clams. Respiration rates of small clams (shell length 3.75-4.50 cm) at 18C are significantly increased after 3 wk of exposure to sea water containing 220-370 micro/g oil/liter. (Katz)
W77-04026

ACUTE TOXICITY OF RESIDUAL CHLORINE IN WASTEWATER TO COHO SALMON (ONCORHYNCHUS KISUTCH) AND SOME RESULTANT HEMATOLOGIC CHANGES,
Municipality of Metropolitan Seattle, Wash. Water Quality Lab.
J. A. Buckley.
Journal of the Fisheries Research Board of Canada, Vol. 33 (1976), p. 2854-2856, 1 tab., 15 ref.

Descriptors: Bioassay, *Toxicity, *Salmon, Laboratory animals, Water pollution effects, Water pollution effects, *Chlorine, Sewage treatment, Pathology, Biochemistry, Fish fry, Seawater, Mortalities.
Identifiers: *Coho salmon, Hematology, Acute toxicity, Continuous flow bioassays, Residual chlorine, Hemoglobin.

Juvenile coho salmon (Oncorhynchus kisutch) were exposed to treated wastewater containing lethal levels of total residual chlorine (TRC) with seawater diluent under continuous flow conditions. The 96-h TL50 was 0.07 mg/liter TRCl2 (4% effluent). Exposure resulted in a slight reduction (significant P=.05) in hemoglobin, a slight (significant P=.05) in methemoglobin, and a temporary decrease (not significant P=.05) in percentage of circulating immature erythrocytes. (Katz)
W77-04027

THE KINETICS OF ACCUMULATION AND EXCRETION OF FERRIC HYDROXIDE IN MYTILUS EDULIS (L.) AND ITS DISTRIBUTION IN THE TISSUES,
Institute of Marine Biochemistry, Aberdeen (Scotland).
S. G. George, B. J. S. Pirie, and T. L. Coombs.
Journal of Experimental Marine Biology and Ecology, Vol. 23, 1976, p. 71-84, 2 tab., 9 fig., 12 ref.

Descriptors: *Mollusks, *Mussels, Commercial shellfish, Iron, Metals, Water pollution effects, *Path of pollutants, Animal physiology, Marine pollution, Heavy metals, Water quality, *Kinetics, Distribution.

Identifiers: Particulate ferric hydroxide, Iron accumulation, Iron excretion, Tissues, Viscera, Kidneys, Gills, Muscle, Mantle.

Iron, which occurs in sea water as particulate ferric hydroxide, is accumulated to high concentrations by the common mussel, Mytilus edulis (L.). The kinetics of the accumulation and excretion of iron in Mytilus has been studied using 59Fe-labelled ferric hydroxide and the tissue distribution and identification at the sub-cellular level determined by analytical electron microscopy. Iron-59 accumulates in linear proportion to the sea-water concentration and is found in all tissues; the concentration factors for viscera, kidneys, gills, muscle = mantle is 25:6:4:1, respectively. The particulate iron is taken up by pinocytosis by special epithelial cells in the gills, gut, kidney and possibly labial palps and held in membrane-bound vesicles, unaccompanied by muscus in the case of gills and kidney, but with mucus present in the digestive diverticulum and mid-gut cells. There is no free iron within the cytoplasm. Approximately 30% of the iron presented to the gut is not absorbed being voided with the faeces. The absorbed iron is exocytosed and then passed on to amoebocytes in the haemolymph for transport to other tissues, a maor portion being excreted by transfer to the byssal threads. (Katz)
W77-04028

COLONIAL AUKS AND EIDERS AS POTENTIAL INDICATORS OF OIL POLLUTION,
Canadian Wildlife Service, Delta (British Columbia).
For primary bibliographic entry see Field 5A.
W77-04029

THE EFFECT OF DISSOLVED PETROLEUM PRODUCTS ON SOME OF THE ASPECTS OF CARBOHYDRATE METABOLISM IN FISHES AND INVERTEBRATES,
All-Union Research Inst. of Marine Fisheries and Oceanography, Moscow (USSR).
N. D. Masmanidi, and G. I. Kovaleva.
Journal of Ichthyology, Vol. 15(5), 1975, p. 811-816, 3 fig., 9 ref. (translation of original Russian abstract).

Descriptors: Oil, *Oil pollution, Water pollution, Path of pollutants, Animal physiology, Pathology, Biochemistry, *Toxicity, Mortality, Marine fish, Shrimp, Commercial fish, Bioassay, *Metabolism.
Identifiers: *Petroleum toxicity, *Carbohydrate metabolism, Toxicity mechaism, Porty, Sile.

Consideration is given in the article to the symptoms of petroleum toxicosis in mobile aquatic organisms (fishes, their larvae and shrimps), as well as to the alteration of some of the indicators of carbohydrate metabolism in fishes, muscles and shrimps under conditions of acute, subacute and chronic toxicity by dissolved petroleum products. It is concluded from the similarity of the reaction of organisms at different phylogenetic levels to the effect of a petroleum toxicity that there may possibly be a single mechanism in the action of dissolved petroleum products on living structures. (Katz)
W77-04030

LONG-TERM EFFECTS OF METHYLMERCURIC CHLORIDE ON THREE GENERATIONS OF BROOK TROUT: TOXICITY ACCUMULATION, DISTRIBUTION AND ELIMINATION,
Environmental Research Lab., Duluth, Minn.
J. M. McKim, G. F. Olson, G. W. Holcombe, and E. P. Hunt.
Journal of the Fisheries Research Board of Canada, Vol. 33 (1976), p. 2726-2739, 4 tab., 5 fig., 38 ref.

Descriptors: *Mercury, Water pollution effects, Path of pollutants, Metals, *Brook trout, Freshwater fish, *Toxicity, Animal physiology, Mortality, Bioassay, Environmental effects, Laboratory experiments, Growth rates, Reproduction, Heavy metals, *Distribution.
Identifiers: *Methylmercuric chloride, Accumulation, Elimination, First generation fish, Second generation fish, Monomethyl mercury, Muscle residues.

During the 144-wk period three generations of brook trout (Salvelinus fontinalis) were continuously exposed to mean water concentrations of methylmercuric chloride (MMC) of 2.93, 0.93, 0.29, 0.09, 0.03, and 0.010 (control) microgram Hg/liter. During the first 39 wk the highest concentration (2.93 microgram Hg/liter) produced deformities and 88% mortality of first generation adults. At an MMC concentration of 0.93 microgram/liter, second-generation trout developed deformities and all but one female died during the 108-wk exposure. No significant effects on survival, growth, or reproduction of second-generation trout were noted at any of the lower MMC concentrations. No toxic symptoms were observed in the third generation at the three lowest MMC concentrations. The maximum acceptable toxicant concentration (MATC) for brook trout exposed to MMC in this water with a hardness of 45 mg/liter (as CaCO3) and a pH of 7.5 fell between 0.93 and 0.29 microgram Hg/liter. The mean 96-h LC50 for yearling (200 g) and 20-wk-old (12 g) juvenile brook trout exposed to MMC was 75.0 microgram Hg/liter, and the application factor (MATC/96-h LC50) lies between 0.004 and 0.013. The accumulation rate of mercury by eight selected tissues of first-generation trout exposed to MMC was relatively rapid at all MMC concentrations tested. The 2-wk tissue Hg water Hg concentration factors ranged from 1 x 101 to 12 x 103, depending on the tissue, whereas after 28-38 wk of exposure the maximum tissue Hg:water Hg concentration factors for both first- and second-generation trout ranged from 6.9 x 103 to 6.3 x 104. The blood, spleen, and kidney accumulated mercury most rapidly and contained the highest residues in both first- and second-generation trout followed by liver, gill, brain, gonad, and muscle in order of decreasing mercury residues. There was no significant elimination of mercury from the tissue of first- or second-generation fish, yet a 'steady state' (micrograms mercury per gram = constant) was reached in all tissues after 20-28 wk of continuous water exposure. Monomethylmercury made up 90-95% of the total mercury present in muscle, the only tissue analyzed for this compound. Mean muscle residues in first-generation trout, dying after 16-28 wk of exposure to 2.93 microgram Hg/liter and in second-generation trout, dying after 64-100 wk of exposure to 0.93 microgram Hg/liter, were 23.5 and 9.5 microgram Hg/liter, respectively. (Katz)
W77-04031

EXPERIMENTAL AND FIELD STUDIES IN HYGIENIC ASSESSMENT OF DRINKING WATER CONTAINING BORON, (IN RUSSIAN),
Institute of General and Municipal Hygiene, Moscow (USSR).
For primary bibliographic entry see Field 5G.
W77-04033

EFFECTS OF DIETARY AROCLOR (R) ON CHANNEL CATFISH (ICTALURUS PUNCTATUS) AND THE SELECTIVE ACCUMULATION OF PCB COMPONENTS,
Illinois Univ. at Urbana-Champaign. Dept. of Veterinary Physiology and Pharmacology.
L. G. Hansen, W. B. Wiekhorst, and J. Simon.
Journal of the Fisheries Research Board of Canada, Vol. 33, p. 1343-1352, 1976, 8 tab., 3 fig., 25 ref.

Descriptors: *Bioassay, *Channel catfish, *Aroclors, *Polychlorinated biphenyls, *Pesticide residues, *Absorption, *Water pollution effects, *Growth rates, *Fish physiology, Chlorinated hydrocarbon pesticides, Organic pesticides, Laboratory tests, Environmental effects, Pesticides.
Identifiers: Tetrachlorobiphenyl.

Channel catfish (Ictalurus punctatus) fingerlin fed a diet containing 20 ppm Aroclor(R) 1242 f 20 wk responded with a reduced weight gain a liver hypertrophy when compared to contro When treated fish were fed the control diet fo subsequent wk followed by 8 additional wk Aroclor feed, they approached control values f liver weight and surpassed the rate of gain for co trol fish. No histopathological lesions were o served in the fish fed PCB. The total PCB in fi declined slightly during an 8-wk PCB-free peri beginning at week 12, but the PCB burd remained constant when the PCB-free period w begun at week 20. During PCB-free periods, the was a shift in residues from the edible carcass the offal. Residues are discussed as components well as total PCB. We found that tetrachlorobiphenyl is more persistent than so higher chlorinated components and that vario tissues accumulated different profiles of co ponents. (Katz)
W77-04034

NITROGEN AND PHOSPHOROUS REMOVA FROM LAKES BY FISH HARVEST,
British Columbia Dept. of Recreation and Cons vation, Penticton. Fish and Wildlife Branch.
For primary bibliographic entry see Field 5G.
W77-04035

ARSENIC CONCENTRATIONS IN SO COEXISTING MARINE ORGANISMS FRO NEWFOUNDLAND AND LABRADOR,
Fisheries and Marine Service, St. Joh (Newfoundland). Biological Station.
V. S. Kennedy.
Journal of the Fisheries Research Board Canada, Vol. 33, p. 1388-1393, 1976, 1 fig., 2 ta 18 ref.

Descriptors: *Shrimp, *Zooplankton, *Arse compounds, Size, Crustaceans, Invertebrat Fish, *Food chains, Copepods, Metals, Path pollutants, Mud, Environment.
Identifiers: *Euphausiids, *Pandalus sp., *Atlan cod.

Inorganic arsenic concentrations in sea water a mud, and total arsenic concentrations in bodies shrimp, zooplankton, and fish from northern Ne foundland and southern Labrador were measur There was a positive relationship between conce tration and carapace length in Pandalus borea and P. montagui and a negative relationship Eualus macilentus. There was no relationsh between concentrations in shrimp eggs a carapace length. Arsenic concentrations zooplankton and fish muscle were relatively l compared with the shrimp species; amphipo contained more arsenic than copepods euphausiids, and American pla (Hippoglossoides platessoides) more than redfi (Sebastes marinus), turbot (Reinhardtius h poglossoides) and Atlantic cod (Gadus morhu There was no evidence of increasing arsenic co centrations through successively higher levels the food chain. (Katz)
W77-04036

TEMPERATURE EFFECTS ON LACTAT GLYCOGEN METABOLISM IN ZINC-INTO ICATED RAINBOW TROUT (SALMO GAIR NERI),
Guelph Univ. (Ontario). Dept. of Zoology.
P. V. Hodson.
Journal of the Fisheries Research Board Canada, Vol. 33, p. 1393-1397, 1976. 1 tab., 2 fi 21 ref.

Descriptors: *Fish physiology, *Lethal lim *Water pollution effects, *Mode of actio

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inbow trout, *Bioassay, *Toxicity, *Zinc, etabolism, *Temperature, *Biochemistry, Salnids, Trout, Laboratory tests, Metals, Environntal effects.
ntifiers: *Gills, *Lactic acid, *Glycogen.

ute, lethal exposures of fish to zinc cause gill nage and subsequent death through tissue oxia. This experiment showed that lactic acid duction and glycogen utilization in dorsal white scle of rainbow trout (Salmo gairdneri) inased with time of exposure to a lethal concenion of zinc. Exposure of trout to zinc at 3, 11, 19 C did not affect the timing or percentage nge of lactic acid production or utilization of cogen. Therefore, the previously observed high rance of zinc by warm-acclimated fish is not to increased resistance to the tissue hypoxia sed by gill damage. (Katz)
7-04037

EROSION DISEASE OF STARRY OUNDER (PLATICHTHYS STELLATUS) D ENGLISH SOLE (PAROPHRYS VETULUS) THE ESTUARY OF THE DUWAMISH ER, SEATTLE, WASHINGTON,
ifornia Univ., Davis. Dept. of Pathology.
. Wellings, C. E. Alpens, B. B. McCain, and B. Miller.
rnal of the Fisheries Research Board of ada, Vol. 33, 1976, p. 2577-2586, 1 tab., 14 fig., ef.

criptors: *Marine fish, Pathology, Biochemis- Water pollution effects, Physiological ecolo- Zoonoses, Industrial wastes, Estuaries, uarine environment, Diseases, Bottom fish, nersal fish, *Fish diseases, *Washington.
ntifiers: *Fin erosion disease, *Starry flounder, glish sole, Platichthys stellatus, Parophrys ilus, Duwamish River(Wash), Puget nd(Wash), Fish pathology, Genetic constitu-

erosion in the starry flounder (Platichthys stels) and English sole (Parophrys vetulus) of the wamish River, Washington, is characterized by erating chronic inflammation and fibrosis with orption of fin rays. The end result is deforma-, shortening, and retraction of residual fin tis- with loss of functional surface. We suggest the incidence of fin erosion in a particular ulation is related to an interaction between etic constitution and multiple environmental ables, including a variety of chemical pollus. (Katz)
7-04038

NERAL METABOLISM DURING THE ONGENESIS OF RAINBOW TROUT (SALMO RDNERI),
higan State Univ., East Lansing. Dept. of mal Husbandry.
. Zeitoun, D. E. Ullrey, W. G. Berger, and W. lagee.
rnal of the Fisheries Research Board of ada, Vol. 33, (1976), p 2587-2591, 2 tab., 1 fig., ef.

criptors: *Rainbow trout, Fish eggs, Laboratonimals, Sodium, Iron, Zinc, Calcium, Potassi- Phosphorous, Copper, Physiological ecology, physiology, Water quality, Laboratory tests, tabolism, Mineralogy.
ntifiers: *Ontogenesis, *metal Requirements.

bow trout (Salmo gairdneri) eggs were col-d from three females, fertilized by the milt of nales per female, and incubated separately. ples were taken before fertilization at +0.5 h on days 1, 1.5, 3.4, 5, 13, 17, 21 at hatching (23), and on day 37, immediately after postyolk orption. The water environment contributed an nated minimum 26% of the Na., 30% of the and 13% of the Zn found at hatching. Derivaof Ca, Na, K, Fe, and Zn from the water environment at postyolk absorption was estimated to be at least 70, 76, 45, 68, and 2%, respectively. All the P and Cu at hatching and in the larva could have been derived from the unfertilized oocyte. (Katz)
W77-04039

RELATIONSHIPS OF EPIBIOTIC FOULING AND MORTALITIES OF EGGS OF THE DUNGENESS CRAB (CANCER MAGISTER),
California Univ., Bodega Bay. Bodega Marine Lab.
W. S. Fisher.
Journal of the Fisheries Research Board of Canada, Vol. 33, 1976, p. 2489-2853, 5 fig., 5 ref.

Descriptors: *Crabs, Marine bacteria, Marine fungi, Marine microorganisms, Crustaceans, *Mortalities, Crustaceans, Zoonoses, *California, Commercial shellfish, Antibiotics, Seawater, Water pollution effects.
Identifiers: *Dungeness crab(Cancer magister), Epibiotic fouling, Egg mortalities, Chemotherapeutic treatment.

This study describes the close association of epibiotic microbial fouling on the eggs of Cancer magister and eggs mortalities. Laboratory experiments showed that nutrient enriched sea water increased the number of measurable filaments on the egg surface and increased the number of egg mortalities. Chemotherapeutic treatment of the sea water decreased the number of filaments and mortalities. The use of antibiotics decreased the number of mortalities while the number of filaments steadily increased, suggesting that antibiotic-sensitive, nonfilamentous forms may be substantially responsible for mortalities caused by microbial fouling. Darkness and ultraviolet irradiation of the sea water had no significant effects on filaments or egg mortalities. Both filamentous fouling and egg mortalities described exponential declines with increased depth into the egg masses.(Katz).
W77-04040

WEED CONTROL AND THE ENVIRONMENT, (IN FRENCH),
Organisation Europeenne et Medterraneenne pour la Protection des Plantes.
For primary bibliographic entry see Field 5B.
W77-04041

LONG-TERM CHEMICAL EFFECTS OF PETROLEUM IN SOUTH LOUISIANA WETLANDS - 1. ORGANIC CARBON IN SEDIMENTS AND WATERS,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
T. Whelan, J. Ishmael, and W. S. Bishop.
Marine Pollution Bulletin, Vol. 7, No. 8, August, 1976, p. 150-155, 3 tab., 3 fig., 19 ref.

Descriptors: Oil, *Oil pollution, Oily waters, *Water pollution effects, *Louisiana, *Wetlands, Marshes, Organic compounds, Organic wastes, Salt marshes, Sediments.
Identifiers: Southern Louisiana wetlands, Organic carbon, Chronic petroleum input, Shallow water marsh, Active oil field, Total organic carbon, Core waters, C17, Oil field sediments, Dissolved organic carbon.

The chemical effects of chronic petroleum input into a shallow water marsh were examined by measuring hydrocarbon levels and dissolved organic carbon content of sediments associated with two active oil fields in south Louisiana. Annual levels of total organic carbon in the surface waters of the oil fields were higher by 1 mg C/l in the salt marsh and 5 mg C/l in the fresh marsh than the respective control sites. Average dissolved organic carbon concentrations in the interstitial waters of cores taken within the oil field environments were 105% higher than the control in the salt marsh and 43% higher than the control in the fresh marsh. Significantly lower ratios of C17 to pristane occurred in both oil field sediments; however, average odd-even predominance values were not indicative of petroleum contaminated sediments. The results indicate that microbial processes are responsible for dissolution of petroleum into dissolved organic carbon and that dissolved organic carbon concentrations may be a more significant measure of chronic petroleum input than hydrocarbon distribution. (Katz)
W77-04043

ACCLIMATION AND TOLERANCE OF ARTEMIA SALINA TO COPPER SALTS,
Royal Univ. of Malta, Valletta. Dept. of Biology.
L. J. Saliba, and R. M. Krzys.
Marine Biology, Vol. 38 (1976), p. 231-238, 3 fig., 6 ref.

Descriptors: Bioassay, Mortality, Toxicity, Copper, Crustaceans, Zooplankton, Sea water, Laboratory studies, *Copper compounds, Copper sulfate, Growth stages, Larvae, *Brine shrimp, *Salts, *Salt tolerance.
Identifiers: Cupric chloride, Cupric acetate, Cupric carbonate, Acclimation.

The brine shrimp Artemia salina L. was acclimated in sea water with cupric chloride, acetate, carbonate, and sulphate, each at concentrations of 0.1, 0.05, and 0.025 ppm Cu++, together with sea water controls. Growth inhibition was observed in all four compounds, generally in direct relationship to the concentration. It was least in sulphate, and increased progressively in chloride, acetate and carbonate in that order. No inhibition, however, was observed in carbonate at 0.025 ppm Cu++. In toxicity tests, 2-week old larvae from each solution were exposed to concentrations of 10, 7.5, 5, 2.5 and 1 ppm Cu++ of the same compounds, together with unacclimated larvae of the same age. Similar tests were held with 6-week old adults acclimated (a) in 0.1 ppm Cu++ (chloride, acetate and sulphate) using the same concentrations and (b) in 0.5 ppm Cu++ (carbonate), using 150, 125, 100, 75, and 50 ppm Cu++. Toxicity to unacclimated larvae and adults differed with the compounds, carbonate being the least toxic, followed by sulphate, chloride, and acetate in increasing order. Larvae acclimated in chloride (0.025 ppm Cu++) and sulphate (0.1 and 0.5 ppm Cu++) showed an increased tolerance to 1 and 2.5 ppm Cu++ compared to untreated controls. Tolerance was not enhanced from 5 ppm Cu++ upwards. In both compounds, adults acclimated in 0.1 ppm Cu++ showed an increased tolerance to concentrations between 1 and 7.5 ppm Cu++ compared to controls. Larval mortality in carbonate was below 50% in all test solutions. Adults acclimated at 0.5 ppm Cu++ showed an increased tolerance to 50 ppm Cu++ compared to controls. (Katz)
W77-04044

ACCUMULATION AND RELEASE OF PETROLEUM-DERIVED AROMATIC HYDROCARBONS BY FOUR SPECIES OF MARINE ANIMALS,
Texas A and M Univ. College Station. Dept. of Biology.
J. M. Neff, B. A. Cox, D. Dixit, and J. W. Anderson.
Marine Biology, Vol. 38, 1976, p. 279-289, 5 tab., 3 fig., 38 ref.

Descriptors: *Oil pollution, Oily waters, Oil spills, Water pollution, Water pollution sources, *Mollusks, *Oysters, *Clams, *Shrimp, Fish, Metabolism, Biochemistry, Lipids, Water pollution effects.
Identifiers: *Aromatic hydrocarbons, Petroleum hydrocarbons, Alkanes, Tissue lipids, Bioaccumulation, Accumulated hydrocarbons, Detoxification.

When exposed to oil-contaminated seawater, marine animals accumulate a wide variety of petroleum hydrocarbons in their tissues. Generally, the aromatic hydrocarbons are accumulated to a greater extent and are retained longer than the alkanes. In all species tested, accumulation of aromatic hydrocarbons appears to be dependent primarily on a partitioning of the hydrocarbons between the exposure water and the tissue lipids. Current evidence indicates that binding of hydrocarbons to tissue lipids is by hydrophobic interactions and not by covalent bonding. Bioaccumulation factors (tissue:water concentration ratio) increase in proportion to the increase in molecular weight of the aromatic hydrocarbons. When returned to oil-free seawater, marine animals rapidly release the accumulated hydrocarbons from their tissues. Release rates are species-dependent. Shrimp and fish, which can metabolize aromatic hydrocarbons, release them more rapidly than clams and oysters, which apparently lack the detoxifying enzymes. Release of hydrocarbons to background or undetectable levels requires from 2 to 60 days. The high molecular weight aromatic hydrocarbons are released more slowly than the low molecular weight hydrocarbons. (Katz)
W77-04045

DISTRIBUTION AND ABUNDANCE OF HEAVY METALS IN FINFISH, INVERTEBRATES AND SEDIMENTS COLLECTED AT A DEEP WATER DISPOSAL SITE,
National Marine Fisheries Service, Highlands, N.J. Sandy Hook Lab.; and National Marine Fisheries Service, Highlands, N.J. Middle Atlantic Coastal Fisheries Center.
For primary bibliographic entry see Field 5B.
W77-04046

EFFECT OF HEAVY METALS ON HATCHING OF BRINE SHRIMP EGGS,
Royal Univ. of Malta, Valletta. Dept. of Biology.
L. J. Saliba, and R. M. Krzyz.
Marine Pollution Bulletin, Vol. 7(10), Oct., 1976, p. 181-182, 1 tab., 1 fig., 12 ref.

Descriptors: *Copper, Copper sulfate, Zinc, *Heavy metals, *Toxicity, Bioassay, Mortalities, Crustaceans, Marine animals, Water pollution effects, Sea water, Lead, Iron, Laboratory tests, *Brine shrimp, *Lethal limit.
Identifiers: *Brine shrimp eggs, Egg hatching.

The effects of heavy metals on marine organisms are currently being studied not only in terms of acute toxicity, but also insofar as they affect natural life-processes at sub-lethal levels, as such levels are more commonly encountered in polluted waters. Growth retardation and interference with reproductive success have been among the most common aspects. (Katz)
W77-04047

THE EFFECT OF CHINA CLAY ON THE FISH OF ST. AUSTELL AND MEVAGISSEY BAYS,
Ministry of Agriculture, Fisheries and Food, Burnham-on-Crouch (England). Fisheries Lab.
K. W. Wilson, and P. M. Connor.
Journal of the Marine Biological Association of the United Kingdom, Vol. 56(3), 1976, p. 769-780, 2 tab., 4 fig., 5 ref.

Descriptors: Commercial fish, *Marine fish, Commercial fishing, Benthic fauna, *Sediment discharge, Sediments, Mineral industry, Mine wastes, On-site surveys, Pathology, Behavior.
Identifiers: *China clay, Avoidance, Gut contents, Flatfish, *English Channel, Mackerel, *St. Anstell Bay(U.K.), *Nevagissey Bay(U.K.).

A trawl survey compared the numbers and distribution of fish on grounds affected by china clay with adjacent unaffected areas. No major differences in commercial catches between the two areas were found but china clay areas appeared to be important nursery grounds for dabs. Solenettes were only found in those areas. Mackerel and garfish were caught in water coloured with suspended china clay but on one occasion whitebait were observed to avoid the affected water. The gut contents of flatfish reflected the differences in the benthos available to them in these areas. (Katz)
W77-04049

DELETERIOUS EFFECTS OF COREXIT 9527 ON FERTILIZATION AND DEVELOPMENT,
Tromsoe Univ. (Norway). Inst. of Biology and Geology.
S. Lonning, and B. E. Hagstrom.
Marine Pollution Bulletin, Vol. 7(7), 1976, p 124-127, 3 tab., 2 fig., 9 ref.

Descriptors: *Toxicity, Bioassay, Mortalities, *Oil pollution, Oil, Water pollution effects, *Marine fish, Invertebrates, Marine benthos, Marine fauna, Reproduction, Pathology, Dispersion, Waste disposal, *Fertilization, *Larval growth stage.

The effect of the water soluble oil dispersant Corexit 9527 was tested on larvae from several species of sea urchins and marine fishes. Severe effects in fertilization and development were registered often resulting in pathological larvae and rapid cytolysis. The combination of Corexit 9527 with oil was found to be even more dangerous to the embryo than Corexit or oil alone. (Katz)
W77-04050

THE DISTRIBUTION OF SHORT-CHAIN HALOGENATED ALIPHATIC HYDROCARBONS IN SOME MARINE ORGANISMS,
Liverpool Univ. (England). Dept. of Oceanography.
A. G. Dickson, and J. P. Riley.
Marine Pollution Bulletin, Vol. 7(9), 1976, p. 167-169, 2 tab., 4 ref.

Descriptors: *Marine animals, Mollusks, Marinfish, Sharks, Mussels, *Chlorinated hydrocarbon pesticides, Chlorides, Animal physiology, Biochemistry, Lodides, Atlantic Ocean, Fluorides, Distribution.
Identifiers: *Halogenated aliphatic hydrocarbons, CFCl3, Methyl lodide, Methyl trichloride, Carbon tetrachloride, Halogenated short chain hydrocarbons, Aerosol propellants, Degreasing fluids, Dry cleaning fluids, Tissue concentrations.

A number of halogenated aliphatic hydrocarbons have been determined in the various organs of three species of molluscs and five species of fish. In general, the compounds were only slightly enriched (2-25 times) on a dry weight basis relative to their seawater concentrations. The usual order of enrichment was found to be brain >gill>liver>muscle. Methyl iodide was found to be the compound most strongly concentrated. (Katz)
W77-04051

EFFECTS OF CRUDE OIL INGREDIENTS ON THE DEVELOPMENT AND OXYGEN UPTAKE OF HARD CLAM, MERETRIX LUSORIA (RODING), (IN KOREAN),
Pusan National Univ. (Republic of Korea). Inst. of Marine Sciences.
B. D. Lee, T. Y. Lee, and P. Chin.
Publication of the Institute of Marine Sciences, National Fisheries University of Busan, Vol. 8, 1975, p. 31-38, 2 tab., 6 fig., 18 ref.

Descriptors: Oil, *Oil pollution, Water pollution effects, Mollusks, *Clams, *Metabolism, *Oxygen, Phenols, Sulfides, Animal physiology, *Respiration, Larvae.
Identifiers: *Hard clams, *Crude oil, n-hexane-soluble chemicals, Cleavage, Larval development, Meretrix lusoria, Larval abnormalities, Respiratory metabolism.

Effect of n-hexane-soluble chemicals, phenol an
sulfide of crude oil ingredient on cleavage, larva
development and oxygen consumption of Meretri
lusoria was examined. In the medium of 3 ppm n
hexane-soluble chemicals, occurrence of abno
malities were totally 47.1% compared to those o
the control. They were 21.4% and 25.7% i
cleavage and larval development stage, respectiv
ly. In the medium of 5 ppm, they were 28.6% an
31.7% in cleavage and larval development stag
respectively, and totally 60.3%. In the medium o
10 ppm phenol, occurrence of abnormalities we
totally 43.1% compared to those of the contro
They were 13.8% and 29.3% in cleavage and larv
development stage respectively. Oxygen co
sumption of isolated gill tissue showed 19.8%
decrease at 3 ppm and 25.9% at 5 ppm n-hexan
soluble chemicals respectively. Its oxygen co
sumption at 10 ppm phenol showed 29.1%
decrease in regards to the control. Respirator
metabolism was seriously inhibited by sulfide th
21.2% decrease was measured in 0.05 ppm sulfid
In case of -.5 ppm, 42.8% decrease was foun
(Katz)
W77-04052

**PETROLEUM COMPONENTS AND OBJE
TIONABLE MALODOROUS SUBSTANCES
FISH FLESH POLLUTED BY BOILER FUE
OIL,**
Okayama Univ. (Japan). Dept. of Public Hygiene
M. Ogata, and T. Ogura.
Water Research, Vol. 10 (1976), p 407-412, 2 tab.,
fig., 5 ref.

Descriptors: Oil, *Oil pollution, Water pollutio
Public health, Laboratory techniques, Marine fis
Commercial fisheries, *Eels, Laboratory animal
Gas chromatography, Bioassay, *Taste, Fuel
Pollutant identification.
Identifiers: Fish flesh, Fish flesh pollutio
*Boiler fuel oil, *Malodorous, Substances, Girel
punctata, Anguilla rostrata, Unsaturated aliphat
hydrocarbons, Aromatic hydrocarbons, *Gre
fish.

Green fish (Girella punctata) and eel (Anguilla ro
trata) were reared in two types of artificially o
polluted test dilutions for the purpose of measu
ing the petroleum substances infiltrating the fles
One test dilution contained untreated mineral
and the other test dilution contained residu
mineral oil after chemical treatment. Vapou
from fish flesh samples were analyzed by g
chromatography. Unsaturated aliphatic hydroca
bons and some aromatic hydrocarbons we
revealed as sources of the repugnant odour. (Kat
W77-04053

**ONTOGENETIC VARIATION IN THE MULT
PLE HEMOGLOBINS OF COHO SALMO
(ONCORHYNCHUS KISUTCH) AND EFFEC
OF ENVIRONMENTAL FACTORS ON THE
EXPRESSION,**
Concordia Univ. Montreal (Quebec). Canad
Dept. of Biological Sciences.
M. A. Giles, and W. E. Vanstone.
Journal of the Fisheries Research Board
Canada, Vol. 33 (1976) p 1144-1149, 2 tab., 3 fi
28 ref.

Descriptors: *Salmon, Oxygen, *Thermal stres
*Thermal pollution, Salinity, *Electrophores
Physiological ecology, Genetics, Juvenile fis
Animal physiology, Biochemistry, Water pollut
effects.
Identifiers: *Coho salmon, Micro-starch-gel ele
trophoresis, Hemoglobin, Smoltification.

Hemolyzates from the blood of coho salm
(Oncorhynchus kisutch) at various stages
development were subjected to micro-starch-g
electrophoresis. Three distinct electrophoretic pa
terns composed of different combinations of
hemoglobin tetramers were observed. Embryo
and yolk-sac alevins possessed 1 cathodic and

c components while fry retained only 3 of the odic polymorphs. During smoltification, 4 athodic components appeared and 2 of the c and the cathodic components of alevin yzates reappeared. This latter pattern was ed until the fish spawned and died. Attempts uce changes in the pattern of development of hemoglobins by exposing fry and presmolts reme variations in dissolved oxygen, tem- re, and salinity were completely unsuccess- atz)
04054

Y OF THE PRODUCTION PROCESS OF NIA LONGIREMIS SARS POPULATION I LAKE DALNEE BY MEANS OF A HEMATICAL MODEL, (IN RUSSIAN),
emiya Nauk SSSR, Moscow. Inst. of Evolu- y Physiology.
rikhod'ko.
biol Zh 11(4), p 32-39, 1975.

iptors: Daphnia, *Mathematical models, ss, *Productivity, Predation, Lakes, Water ion.
fiers: *Daphnia-longiremis, *USSR(Lake e).

hematical model was used to determine an- dynamics of the number, biomass and ction of the D. longiremis population. The ing results are compared with the observa- data for the real population. The model is o study the effect of changes in the value of reserves and the influence of predation ction (USSR).--Copyright 1976, Biological acts, Inc.
04055

EFFECT OF AMMONIA EXPOSURE ON STRUCTURE OF THE RAINBOW TROUT MO GAIRDNERI),
l Univ. (England). Research Unit for Com- ve Animal Respiration.
art.
al of Fishery Biology, Vol. 8, 1976, p. 471- fig., 34 ref.

iptors: *Rainbow trout, Freshwater fish, logy, Animal physiology, *Toxicity bioas- Mortality, Water pollution, Path of pollu- Water pollution effects, Oxygen, onia.
fiers: *Gill structure, Gill damage, Acutely concentrations, *Toxic mechanisms, Long- exposure, Histopathological changes, Dis- ncidence.

ructure has been studied in fish exposed to s ammonia concentrations. Gill damage ng from exposure to acutely lethal concen- s was relatively minor and unlikely to have primary cause of death. Alternative toxic nisms have been discussed. Following long- exposure to ammonia there were severe athological changes in gill structure and ox- ptake may have been seriously impaired. A ncidence of disease was also observed.
04056

E METALS (AS, CD, CU, FE, AND ZN) IN IC COD, BOREOGADUS SAIDA AND CTED ZOOPLANKTON FROM THCONA SOUND, NORTHERN BAFFIN ND,
Columbia Research Council, Vancouver. f Applied Biology.
an, and R. O. McElroy.
al of the Fisheries Research Board of a, Vol. 33, 1976 p 2836-2840, 3 tab., 2 fig., 5

ptors: *Metals, Arsenic compounds, ium, *Copper, *Iron, *Zinc, Zooplankton, Marine fish, Cold-water fish, Arctic Ocean, Physiology, Copepods, *Trace elements.
Identifiers: *Arsenic, *Cod, Boreogadus saida, *Arctic cod, Northern Baffin Island, *Strathcona Sound, *Trace metals.

Arctic cod (Boreogadus saida) were captured by bottom trawl at depths of 120-300 m. Zooplankton were obtained by bottom to surface tows from the Arctic cod habitat. Average concentrations of arsenic (As) and zinc (Zn) were higher in Arctic cod fillets than in livers from the same fish: cadmium (Cd) and iron (Fe) concentrations were higher in livers. The difference between copper (Cu) concentrations in muscle and liver was not significant. As and Zn in whole fish and As in fillets from seven specimens were positively correlated to body weight. Cu and Fe in whole fish were negatively correlated to body weight, whereas Cd was not related to body weight. Examination of Arctic cod stomach contents indicated that planktonic copepods were important in the diet. Cd levels were 5-8 times higher in the unsorted copepods than in the Arctic cod, whereas As, Cu, Fe, and Zn were higher in the fish than in the copepods. (Katz)
W77-04057

DISTRIBUTION OF HEAVY METALS IN TISSUES OF THE COMMON SEAL,
Liverpool Univ. (England). Dept. of Botany.
T. M. Roberts, P. B. Heppleston, and R. D. Roberts.
Marine Pollution Bulletin, Vol. 7(10), 1976, p. 194-196, 1 tab., 3 fig., 24 ref.

Descriptors: *Lead, *Cadmium, *Mercury, Atlantic Ocean, Mammals, *Heavy metals, Water pollution effects, Path of pollutants, Biochemistry, Laboratory tests, Animal physiology, Distribution.
Identifiers: *Common seal, Phoca vitulina, Tissue levels of lead, Tissue levels of cadmium, Tissue levels of mercury, West Scotland.

The lead, cadmium and mercury content of soft tissues and bone were determined for the common seal (Phoca vitulina) collected from off the coast of East Anglia and the West of Scotland. Lead levels were low in all tissues, cadmium accumulated with age in the kidney of West Scotland seals and mercury accumulated to high levels in the liver of seals from both areas. Comparison of our results with those of other workers, suggests that the rate of mercury accumulation in the liver of seals increases in the order: Canadian Arctic and Atlantic coast < West Scotland < East Anglia < Netherlands coast. Accumulation of mercury in the kidney and spleen of older seals, lends tentative support to the hypothesis that a protective demethylation and retention process in the liver may begin to leak mercury to other tissues at the high concentrations which have been recorded in the liver of older seals, and at the high dose rates which have been used in toxicological experiments. (Katz)
W77-04059

MERCURY IN TISSUES OF MUSSEL OFF SOUTHERN CALIFORNIA,
Southern California Coastal Water Research Project, El Segundo, Calif.
R. P. Eganhouse.
Marine Pollution Bulletin, Vol. 7(8), 1976, p. 145-147, 1 tab., 2 fig., 8 ref.

Descriptors: *Mercury, *Heavy metals, Water pollution, *Mussels, Mollusks, Intertidal areas, Sewage, *California, Water pollution effects, Laboratory tests, Pollutant identification.
Identifiers: Intertidal mussel, Tissue mercury contents.

Total mercury content has been determined in three tissues of the intertidal mussel Mytilus californianus collected at locations along the southern California coast and at island control stations. The apparent influence of certain harbours and municipal wastewater outfalls was reflected by the relatively higher levels of mercury in all tissues of mussels from these areas. In general, the concentrations reported here are lower than those in mussels on west European coasts. (Katz)
W77-04060

PETROLEUM-DEGRADING ACHLOROPHYLLOUS ALGA PROTOTHECA ZOPFI,
Maryland Univ., College Park. Dept. of Microbiology.
For primary bibliographic entry see Field 5A.
W77-04062

SOME EFFECTS OF PETROLEUM ON ESTUARINE AND MARINE MICRO-ORGANISMS,
Maryland Univ., College Park. Dept. of Microbiology.
J. D. Walker, and R. R. Colwell.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A016 501, Price codes: A02 in paper copy, A01 in microfiche. Canadian Journal of Microbiology, Vol. 21(3), 1975, p. 305-313, 6 tab., 4 fig., 13 ref.

Descriptors: Oil, *Oil pollution, Water pollution effects, Aquatic microorganisms, Marine microorganisms, Soil bacteria, Oil spills, Waste disposal, *Chesapeake Bay, Yeasts, Fungi, Estuaries, Sediments, Marshes.
Identifiers: *Estuarine microorganisms, Oil-contaminated sediments, Petroleum hydrocarbons, *Crude oil, No. 2 fuel oil.

Degradation of mixed hydrocarbon substrate in a system comprising water from an environment relatively free of oil and a sediment inoculum from an oil-contaminated site was significantly greater than when sediment from the non-oil-contaminated environment served as inoculum. Mixed hydrocarbon substrate, however, was observed to have a limiting effect on the growth of autochthonous bacteria from the non-oil-contaminated estuarine source. Growth and cell yield were similarly reduced when marine sediment bacteria were cultured in seawater supplemented with mixed hydrocarbon substrate. The addition of a South Louisiana crude oil or a No. 2 fuel oil to water and sediment collected from a marsh area of Chesapeake Bay showed no limiting effects on growth of the total heterotrophic microbial flora when examined over a 28-day period. (Katz)
W77-04063

MICROBIAL PROCESSES OF PHENOL DEGRADATION IN THE VOLGA AND ITS RESERVOIRS, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
A. K. Stolbunov.
Gidrobiol Zh 12(1), p 33-39, 1976.

Descriptors: *Phenols, *Biodegradation, Bacteria, *Microbial degradation, Reservoirs, Water pollution.
Identifiers: USSR, *Volga River.

In the Volga River (USSR) the number of heterotrophic phenol-degrading bacteria was as follows: in the polluted sections-about 80-230,000 cells/ml, in moderately polluted sections-900-50,000 cells/ml, and in pure sections-500-7000 cells/ml. The degradative activity for the same sections constituted 70-100%, about 30% and about 20% of phenol degradation under standardized conditions, respectively. The latter values characterize adaptibility of water microflora to degradation of phenols of autochthonous origin. Allochthonous phenol biodegradation is more extensive (in the Rybinsk reservoir (about 20 km from the pollution source)) than under river conditions (in the Volga near Gorky (about 100 km)).--Copyright 1976, Biological Abstracts, Inc.

W77-04064

INVESTIGATIONS ON THE INFLUENCE OF SALT CONCENTRATION ON THE ACTIVITY OF BACTERIAL POPULATIONS FROM FRESH AND WASTE WATERS, (IN GERMAN),
Kiel Univ. (West Germany). Institut fuer Meereskunde.
K. Gocke.
Kiel Meeresforsch 30(2), p 99-106, 1974.

Descriptors: Rivers, Effluents, Salinity, Salts, Sewage, *Bacteria, Coasts, Growth rates, Nutrients, *Self purification.
Identifiers: *Saprophytic bacteria.

Activity and number of saprophytic bacteria in relation to salt concentration were measured in river water containing various levels of NaCl. The salinity requirements of the 10 most frequently occurring bacteria were determined. The growth rate of natural bacterial populations in relation to the salt concentration was measured after nutrient addition. The activity and the number of bacteria were strongly inhibited with increasing salt concentrations. Only a slight adaptation was found. With higher amounts of nutrients rapid changes in the population were observed. Bacterial populations carried into the sea by rivers and sewage effluents apparently can play only a minor role in the self-purification of coastal waters.--Copyright 1976, Biological Abstracts, Inc.
W77-04065

STUDY ON THE LONG-TERM EFFECTS OF SOME DETERGENTS ON THE SEQUENCE OF DEVELOPMENT OF THE SEDENTARY POLYCHAETE, CAPITELLA CAPITATA (FABRICIUS), (IN FRENCH),
Centre d'Oceanographie, Marseille (France). Station Marine d'Endoume.
J. P. Foret.
Tethys 6(4), p 751-778, 1974.

Descriptors: *Detergents, Water pollution effects, *Lethal limit, Growth rates, Growth stages.
Identifiers: Amines, *Capitella-capitata, Esters, Maturation, Metamorphosis, Ovocytes, *Polychaetes, Propylene.

The sublethal effects of 6 detergents were tested on the life cycle of the polychaete C. capitata. This species is characteristic of polluted bottom areas. Specimens are obtained from natural populations and studied in the laboratory. The tested detergents, issued from the oil industry, are 3 anionic (alkylarylsulfonate, lauric alcohol sulfate, fatty alcohol oxyalkyl ester) and 3 non-ionic (oxyethylene oxypropylene amine, polyethylene glycol ester, oxyethylene alcohol). The short duration of the life cycle of C. capitata permits proposal of a method for qualitative and quantitative evaluations of these pollutants' sublethal effects. The disturbing effects depend on the concentrations and stage of the life cycle. When the concentration increases, the length of the different phases increases and decrease in the number of juveniles is observed. The more susceptible stages are maturation of the ovarian tissue and ovocytes and metamorphois.--Copyright 1976, Biological Abstracts, Inc.
W77-04067

RADIOECOLOGICAL STUDY OF CHAROPHYTA, (IN RUSSIAN),
Akademiya Nauk Litovskoi, SSR, Vilnius. Inst. of Botany.
D. P. Marchyulenene, R. F. Dushauskene-Duzh, and N. A. Chibiraite.
Gidrobiol Zh 12 (1), p 12-19, 1976.

Descriptors: *Radioecology, Algae, *Radioactivity, Absorption, Radioisotopes, *Path of pollutants, Cytological studies, Phytoplankton, Cladophora, Reservoirs, Water pollution.
Identifiers: *Charophyta, Duckweed, Elodea.

Accumulation of 90 Sr, 144 Ce, 137 Cs and 106 Ru in Charophyta depends on the species, while accumulation of 90 Sr and 137 Cs depends on sampling time and vegetative period. The accumulation level and the degree of removal of 90 Sr and 137 Cs in Charophyta depend on the amount of exchange of Ca and K, respectively, and the concentration of these elements in the water. 90 Sr and 137 Cs uptake by Charophyta cells occurs during short-term experiments due to absorption on a cell membrane and to intense ion exchange between the environment and cellular components; the 144 Ce and 106 Ru uptake by the Charophyta cells occurs in short-term values for aquatic plants notable for high mineralization (Charophyta) appear to be approximately 16 times as high under natural conditions at those under experimental conditions; the accumulation factor (AF) values of 90 Sr for aquatic plants of a rather low mineralization (phytoplankton, Cladophora, Elodea and duckweed) were the same under experimental and natural conditions. Apparently the AF differences of 90 Sr in aquatic plants under experimental and natural conditions depends chiefly on the amount of mineral substances in them. Charophyta appears to be an important link in radionuclide migration in reservoirs and useful for studying processes and mechanisms of radionuclide accumulation.--Copyright 1976, Biological Abstracts, Inc.
W77-04068

ESTIMATION OF THE PRODUCTION POTENTIALS OF THE PHYTOBENTHOS IN THE NORTHERN DONETS-DONETS BASIN CANAL,
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
R. A. Kalinichenko.
Gidrobiol Zh 12(1), p 98-102, 1976.

Descriptors: *Bentho, *Photosynthesis, *Cyanophyta, *Diatoms, *Productivity, *Chlorophyta, Biomass, Algae, *Canals, Water pollution.
Identifiers: Cladophora-fracta, Cladophora-glomerata, Diatoma-vulgare, Enteromorpha-intestinalis, Hydrodictyon-reticulatum, Melosira-varians, Navicula-cryptocephala, Nitzschia-sigmoidea, Nitzschia-vermicularis, Dedogonium, Oscillatoria-princeps, Phormidium-autumnale-F-uncinata, Spirogyra-Sp, *USSR, *Donets River Basin Canal(USSR).

The photosynthetic activity of the microphytobenthos in the Northern Donets-Donets Basin canal (USSR) during the domination of blue-green algae and diatoms (Navicula cryptocephala, Diatoma vulgare, Melosira varians, Nitzschia sigmoidea, Nitzschia vermicularis, Phormidium autumnale f. uncinata, Oscillatoria princeps)average 0.121 mgO2/mg biomass-day in the spring, 0.272 mgO2/mg-day in the summer and 0.044 mgO2/mg-day in the winter. The photosynthetic activity of green filamentous algae (Cladophora fracta, C. glomerata, Enteromorpha intestinalis, Spirogyra sp., Oedogonium, Hydrodictyon reticulatum) was lower and averaged 0.0167, 0.0474 and 0.0100 mgO2/mg dry weight/day in the spring, summer and winter, respectively. No clear dependence between the photosynthetic activity and biomass was noted. The significant photosynthetic activity of the phytobenthos in the canal facilitates the rapid formation of algal films and accumulations on the concrete and crushed rock.--Copyright 1976, Biological Abstracts, Inc.
W77-04069

PRIMARY PRODUCTION OF GREEN FILAMENTOUS ALGAE FROM THE KIEV RESERVOIR, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
L. E. Kostikova.
Gidrobiol ZH 12(1), p 62-70, 1976.

Descriptors: *Primary productio
*Chlorophyta, Reservoirs, Biomass, Algae, W
pollution.
Identifiers: Cladophora-crispata, Cladoph
fracta, Cladophora-glomerata, Epiphytes,
mentous algae, Hydrodictyon-reticulatum,
geotia-laetevirens, Oedogonium-Sp, Oedogon
vaucherii, Russian-sfsr, Spirogyra-Crassa, US
*Kiev Reservoir(USSR).

Cladophora fracta Kuetz., C. glomerata
Kuetz., C. crispata Kuetz., Oedogonium vauc
(Le Cl.) Al. Br. Wittr., Oedogonium sp., Spiro
crassa Kuetz., Hydrodictyon reticulatum Lag
Mougeotia latevirens (A.Br.) Wittr., and
epiphytes produce about 90% of the total bio
of the filamentous algae in the Kiev rese
(Russian SFSR, USSR). Using the diurnal pro
tion determined in various months of the ve
tive period, total production was calculated fr
m2 of a algal vegetation.--Copyright 1976, Bio
cal Abstracts, Inc.
W77-04070

**MEROMICTIC MECHANISMS IN A COAS
LAKE, (IN FINNISH),**
Abo Akademi, Turku (Finland). Inst. of Biolo
T. Lindholm.
Zool Revy 38(1), p 3-10, 1976.

Descriptors: Lakes, *Meromixis, Sali
Halocline, Sea water, Nutrients, Phytoplank
*Saline water intrusion, Primary producti
Water pollution.
Identifiers: *Finland, *Coastal lakes.

The fjordlike coastal lake Vastra Kyrksu
(Aland, SW Finland), isolated from the Balt
land upheaval probably 100 yr ago, was r
nected with the sea with a small canal in 1932
lake (area 60 ha, maximum depth 18 m) is
meromictic with a halocline between 4-8 m.
salinity of the stagnant anoxic water is rather
stant, slightly above 4.0%, but the salinity o
surface water fluctuates 0.3-3.3%. The salinit
the halocline are regulated by the amount an
periodicity of affluent fresh water and by
water level fluctuations of the Baltic which d
mine the pattern and magnitude of seawat
fluxes. Certain influxes of seawater cause an
of some stagnant, nutrient-rich water incre
the phytoplankton primary production.--Biolo
Abstracts, Inc.
W77-04071

**DATA ON SEASONAL VARIATIONS
PLANKTON AND ON THE HYDROLO
CHARACTERISTICS OF THE NORTH
OFF OSTENDE AND NIEUWPOORT: PE
FROM 1969 TO 1971, (IN FRENCH),**
Brussels Univ. (Belgium). Lab. of Compar
Anatomy.
R. Segebarth-Orban.
Ann Soc R Zool Belg 105 (1/2), p 193-227, 197

Descriptors: Plankton, *Chlorophyll, *Samp
*Zooplankton, *Copepods, *Nutri
*Phytoplankton, Larvae, Rivers, Estu
Seasonal, Water pollution.
Identifiers: Appendicularia, *Belgium, Biva
Nieuwpoort, Ostende, Polychaetes, *North S

Samples were taken at various stations off Ni
poort and Ostende (Belgium). Meterological c
tions, current, seasonal variations in salinity
mineral salt concentrations were descr
Chlorophyll-a concentrations were highest in
of the 1st year and in Oct. of the 2nd
Copepods made up the highest average fracti
zooplankton, then copepod nauplii, bivalve la
polychaete larve and Appendicularia, in dec
ing order. A comparison of the sampling sta
showed that all followed similar fluctuation c
and that water freshening, nutrient element
centrations and the quantity of phytopla
were highest in the coastal stations and decr

distance from the coast increased. This menon was attributed to the emptying of l rivers in the area under study.--Biological cts, Inc.
4072

OF THE MINERAL NUTRIENTS CON-TED BY THE RIVER RHONE (FRANCE) HE ORGANIC PRODUCTION OF THE RS OF THE GULF OF LIONS, (IN CH),
te.
6(4), p 727-740, 1974.

ptors: *Nutrients, *Measurement, phates, *Nitrates, *Silicates, Photosynthes-eralogy, Carbon, Productivity.
iers: *France, *Minerals, *Rhone France), Gulf du Lion(France).

rements of nutrients (phosphates, nitrates lcates) were carried out for 3 yr on the River. Experimental work on dilution ses shows that absorption, desorption or lation of P compounds do not occur. The t of photosynthetic C computed from the nt content of the fresh water and referred to ution area is about 30-45 g C/m2/yr. This ad-l supply makes the Golfe du Lion the most ctive zone of the western basin of the rranean.--Biological Abstracts, Inc.
4073

DY ON THE INFLUENCE OF SALINITY TUATIONS UPON THE BACTERIAL A OF THE LAGOON CIENAGA GRADE ANTE MARTA (COLOMBIA) AND THE CENT COASTAL REGION, (IN GER-
Univ. (West Germany). Institut fuer skunde.
imary bibliographic entry see Field 5B.
4076

OBIOLOGICAL AND CHEMICAL STUDY ATER IN THE BAIA DE ARIES MINE, (IN NIAN),
atea de Stiinte Biologice din R.S.R., rest.
imary bibliographic entry see Field 5A.
4077

ERIAL ASSIMILATION OF ORGANIC ER IN WATERS WITH VARIOUS POL-ON LEVELS, (IN RUSSIAN),
mary bibliographic entry see Field 5B.
4081

OF POPULATIONS OF PLUMATELLA OSA (PALLAS) (BRYOZOA, PHYLAC-MA) IN THE SELF-PURIFICATION OF A AND A STREAM, (IN FRENCH),
Univ. (Belgium). Laboratories de ologie, de Systematique et d'Ecologie les.
mary bibliographic entry see Field 5G.
4083

PROBLEMS OF SANITARY OBIOLOGY, (IN RUSSIAN),
mary bibliographic entry see Field 5A.
4085

TIONS IN CD, PB AND CU CONTENT ATERS OF THE LOWER ESTUARY OF SAINT LAWRENCE DURING THE ER OF 1972, (IN FRENCH),
Univ., Rimouski. Dept. of Oceanography; uebec Univ., Rimouski. Dept. of Pure es.
mary bibliographic entry see Field 5A.
4086

ON THE FAUNA OF A FRESHWATER FLAT IN THE ELBE ESTUARY (GERMANY), (IN GERMAN),
Hamburg Univ. (West Germany). Museum of Zoology.
O. Pfannkuche, H. Jelinek, and E. Hartwig.
Arch Hydrobiol 76(4), p 475-498, 1975.

Descriptors: *Cyanophyta, Europe, Algae, Diatoms, Estuaries, Marine algae, Nutrients, Marine animals, Water pollution effects.
Identifiers: Colonization, *Elbe estuary(W. Germany), Flagellate, Scirpus.

Investigations were made on the fauna and abiotic milieu of the freshwater flats of Faehrmannssand in the Elbe estuary (West Germany, near Hamburg). The area consists of extensive sand and mudflats. The latter are mainly covered with Scirpus. The open mudflats are usually covered with bluegreen algae, flagellates and diatoms. The fauna is represented by eurytopic freshwater organisms, especially saprobic species, and by marine immigrants. The colonization of this unique biotope by rather unspecialized animals and their relations to environmental conditions are discussed. Regarding the geographical and nutritional relations, the ecological characteristics of the fauna are discussed and classified. The considerable effect of the freshwater flats for regeneration of the polluted Elbe water and their importance as feeding and breeding areas for the river fauna are emphasized.--Copyright 1976, Biological Abstracts, Inc.
W77-04087

BACTERICIDAL ACTION OF ELECTROHYDRAULIC EFFECT IN WATER, (IN RUSSIAN),
Moskovskii Gosudarstvennyi Meditsinskii Institut (I) (USSR).
S. N. Cherkinskii, G. P. Yakovleva, A. N. Mel'Nikova, G. F. Savel'Eva, and A. A. Semenova.
Gig Sanit 2, p 7-10, 1976.

Descriptors: *E coli, *Bactericides, Bacteria, Water pollution effects.
Identifiers: *Electrohydraulics.

Autoclaved spring water contaminated with Escherichia coli was subjected to electrohydraulysis with discharges of 80, 100 and 200 J, which was strongly bactericidal with 25 impulses (81.7%, 96.1% and 99.85%, respectively) despite a high initial contamination level. The dependence of the bactericidal effect on the initial contamination level did not differ significantly in all observations. The hydraulically treated water showed a bactericidal aftereffect which increased with increasing exposure time; a reliable effect was observed 15 h after contamination and it increased to 80.5% during 24 h.--Copyright 1976, Biological Abstracts, Inc.
W77-04088

THYROID MODIFICATIONS IN RATS AFTER ADMINISTRATION OF MINERAL RESIDUE FROM DRINKING WATER, (IN FRENCH),
Institutul de Igiena si Sanatate Publica, Bucharest (Rumania).
E. Bordas, E. Bretter, and Z. Uray.
Rev Roum Med Endocrinol 13(4), p 271-275, 1975.

Descriptors: *Potable water, Mineralogy, Proteins, *Radioactivity, Water pollution, Rodents.
Identifiers: Goiter, Hormone, Iodine, *Mineral residues, Thyroid.

Over a period of 120 days groups of rats were given mineral residues of water taken from 2 different rural localities where I level was at least 10 micro-g/l. This water was rich in minerals but did not contain significant amounts of known goiter-causing elements. Na131 I was administered just before sacrifice in order to determine thyroid radioiodofixation and the index of conversion of mineral I to protein I. These 2 parameters were reduced in rats given the rural water residues in comparison to the controls. The water from one of the localities was considered to have an antithyroid complex because of its significant inhibition of I fixation and thyroid hormone synthesis.--Copyright 1976, Biological Abstracts, Inc.
W77-04089

MICROBIOLOGICAL CHARACTERISTICS OF THE ROS/ RIVER AND SOME OF ITS TRIBUTARIES, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
V. I. Kachan.
Gidrobiol ZH 12(1), p 94-97, 1976.

Descriptors: *Microbiology, *Bacteria, Coliforms, Rivers, Aquatic fungi, Microorganisms, Plankton, Yeasts, Tributaries, Water pollution.
Identifiers: Actinomycetes, Azotobacter, Bacilli, Cocci, *Ros River(USSR), Saprophytes, Ukrainian-SSR, *USSR.

On the basis of total quantity of bacteria, quantity of saprophytes, and coliform-index, the sanitary-microbiological condition of the Ros/ River and 5 major tributaries (Ukrainian SSR, USSR) was determined in 1971. The quantity of microorganisms in the Ros/ basin was primarily affected by the nature and availability of organic substances. Except for a few sections (the upper reaches and below the city of Belaya Tserkov/), the Ros/ was less polluted than its tributaries, which had little effect on the microbiological characteristics of the Ros/. The bacterioplankton of the Ros/ basin included spore-forming bacteria, cocci, Azotobacter-like cells, yeasts, actinomycetes and fungi, with baccilli the dominant form. Data on the sanitary condition of the studied rivers may facilitate the rational placement of commercial enterprises and the planning and implementation of antipollution measures.--Copyright 1976, Biological Abstracts, Inc.
W77-04093

THE USE OF ENZYME-KINETIC-METHODS FOR BACTERIOLOGICAL EXAMINATIONS OF HEAVILY POLLUTED SURFACE WATERS, (IN GERMAN),
Innsbruck Univ. (Austria). Hygienisches Institut.
F. Tiefenbrunner, F. Duesing, J. Krambeck, and J. Overbeck.
Zentralbl Bakteriol Parasitenkd Infektionskr Hyg Erste Abt Orig Reihe B Hyg Praev Med 161(5/), p 498-518, 1976.

Descriptors: Water pollution, *Bacteria, Enzymes, *Microorganisms, *Nutrients, *Productivity, *Organic matter, Biodegradation, Kinetics, Methodology.
Identifiers: Biotope, *Heterotrophic microorganisms.

The greatest fraction of nutrients dissolved in water are organic substances which are decomposed, transformed and mineralized by heterotrophic microorganisms. Investigations concerning energy transfer in an aquatic ecosystem, or practical examinations of the pollution load of surface waters, cannot be done when based exclusively on counts of microorganisms of the production or destruction group. It is important for heterotrophic bacteria that productivity parameters for these numerical estimations are also provided. For marked test-substrates it was possible to measure the turnover in natural populations. After improvement of the technique in determining the decomposition rates of individual organic substrates, a way was found to determine static descriptions of an aquatic biotope, and to make possible dynamic description of nutrient transfer. The kinetic parameters computed from these measurements are the maximum uptake velocity

(Vmax), the turnover velocity (Tt) and the transport constant (Kt). The maximum uptake velocity of a substrate is the heterotrophic capacity of the biotope for this substrate. Only quickly assimilatable can be used, e.g., hexoses, organic acids, amino acids, etc. The applicability of this technique was tested in polluted biotopes. Whether a decomposition gradient is reflected in the kinetic data was investigated. A small eutrophic lake in the E Holstein Lake District (350 ha, 9.5 m mean water depth) was the test biotope. Emptying into the lake was the runoff of a biological water treatment plant with 12,000 population equivalents and without notable business or industry. In a rectangular investigation area with 30 sampling stations positioned close to the outlet of the water treatment plant into the lake, kinetic tests were carried out at 48 h intervals and compared with bacteriological, chemical and meteorological sample results taken at the same time. Conditions in the biotope are reflected in the kinetic data and at individual sampling stations (corresponding to their distance from the drainage outlet); significant differences in the kinetic data were obtained. The enzyme--kinetic substrate turnover of individually marked substrata is suitable for investigation of polluted biotopes (drainage waters); it permits conclusions regarding the magnitude of the actual course of processes and changing microorganism populations. The heterotrophic system in a polluted biotope is exceptionally flexible and variable in dependency upon complex environmental conditions and is constantly subject to qualitative and quantitative changes. The use of an enzyme-kinetic method in this ecosystem provides the possibility of understanding these rapidly occurring processes. Enzyme-kinetic methods represent a valuable addition to presently-used techniques of assessment of heterotrophic activities in a polluted biotope.
W77-04094

USE OF RECORDING METHOD OF AFTERGLOW OF GREEN ALGAE IN DETERMINING SOIL AND WATER POLLUTION BY PHYTOXIC SUBSTANCES, (IN RUSSIAN),
Moscow State Univ. (USSR). Lab. of Space Biology.
D. N. Matorin, P. S. Venediktov, and M. G. Makevnina.
Biol Nauki (Mosc) 18(12), p 122-125, 1975.

Descriptors: Ureas, *Chlorella, *Bioassay, *Pesticide residues, *Herbicides, Toxicity, Algae, Water pollution, Soils, *Chlorophyta, Methodology, *Phytotoxicity.
Identifiers: Afterglow, Atrazine, Diuron, Fenuron, Heximure, Methurin, Monuron, Prometryne, Propazine, Pyramin, Randox, Simazine.

Active urea derivatives (diuron, monuron, fenuron, methurin), active triazine derivatives (prometryne, atrazine, propazine, simazine) and other preparations (dicryl, 2,4-D, heximure, Pyramin, Randox) in concentrations of 10-7--10-5 M decreased the millisecond glow intensity of Chlorella cells by 50%. This bioassay possibly can determine the presence of herbicide residues in soil quickly and accurately. As compared to chemical methods, it is sufficiently universal, does not require preliminary identification of the toxic chemicals or their metabolites and enables determination of phytotoxic levels based on functional cell disturbances.--Copyright 1976, Biological Abstracts, Inc.
W77-04097

BEHAVIOR OF PATHOGENIC AND SANITARY-INDICATOR BACTERIA UNDER CONDITIONS OF WATER POLLUTION BY ORGANOPHOSPHORUS PESTICIDES, (IN RUSSIAN),
Kiev Research Inst. of General Communal Hygiene (USSR).
E. M. Yurovskaya.
Gig Sanit 9, p 102-103, 1975.

Descriptors: *Bacteria, *Bioindicators, Water pollution, E coli, Microorganisms, *Pesticide residues, Phosphorus, Salmonella, Shigella, Public health, Streptococcus.
Identifiers: Bacilli, Colon, Dysentery, Enterococci, Malathion, Parathion, Pathogenic, Trichlorfon, *Organophosphorus pesticides.

Water pollution by organophosphorus pesticides (trichlorfon, methyl parathion, malathion and their mixtures) in maximum allowable concentrations and in concentrations exceeding them 10-fold at water temperatures of 5-6 and 20-22C did not change the behavior and numerical characteristics of dysentery bacteria, colon bacilli or enterococci. Trichlorfon in a concentration of 1 g/l in river water at 20-22 inhibited the development of Escherichia, fecal streptococci, Shigella and Salmonella A and B. The behavior and properties of indicator microorganisms (colon bacilli, enterococci) in waters polluted with organophosphorus pesticides in comparison with their development in pure water makes them sanitary indicators also in water with the indicated type of pollution.--Copyright 1976, Biological Abstracts, Inc.
W77-04099

TOXICOLOGICAL EFFECTS OF DIETHYLNITROSAMINE (DENA) IN GUPPIES (LEBISTES RETICULATUS), (IN GERMAN),
Deutsches Krebsforschungszentrum, Heidelberg (West Germany). Inst. of Toxicology and Chemotherapy.
H. R. Scherf.
Z Krebsforsch Klin Onkol 86(2), p 155-163, 1976.

Descriptors: *Toxicity, Organic compounds, Water pollution effects, *Lethal limit.
Identifiers: Carcinogens, Guppies, *Lebistes-reticulatus, Lesions, Nitrosamines, Peritoneal cavity, *Amines, *Diethylnitrosome.

In a chronic test, guppies were incubated in darkness in DENA concentrations of 26 and 100 mg/l up to 7 mo. This treatment led to lesions in organs of the peritoneal cavity. Tumors were not observed. The cause of the lack of carcinogenic activity is discussed.--Copyright 1976, Biological Abstracts, Inc.
W77-04100

5D. Waste Treatment Processes

AN INVESTIGATION OF CONDENSATES AND THEIR CONTRIBUTION TO EFFLUENT DISPOSAL FROM SUGAR MILLS. PART II. STUDIES ON THE REMOVAL OF ETHANOL FROM CONDENSATES,
Sugar Research Inst., Mackay (Australia).
J. D. Blake, R. Broadfoot, and D. H. Foster.
International Sugar Journal, Vol. 78, No. 934, p 291-295, October, 1976. 5 fig, 5 tab.

Descriptors: *Condensation, Effluents, *Waste disposal, *Industrial wastes, Mills, Food processing industry, *Alcohols, Laboratory tests, *Waste water treatment.
Identifiers: *Ethanol.

Laboratory pilot-scale trials were performed to study the removal of ethanol from condensates of sugar mills. The procedure adopted was steam-stripping. A steam-stripping still was a glass column packed with Raschig rings. Samples of feed, distillate, and residue were analyzed. Resultant low ethanol levels justified the pilot study. The pilot unit consisted of a 200 mm diameter steel pipe packed to a height of 2.14 meters with 25 mm Raschig rings. It was shown that final ethanol content was limited by ethanol in the exhaust steam which fluctuated as condensates of variable ethanol content were used for steam generation. The problem was solved by using a reboiler to generate steam from the condensate by heat exchange with the exhaust steam previou
used. It was necessary to build a hot water tra
the line to the reboiler to reduce 'wetness.'
amount of ethanol depends on the cane quality
results from cane burning to remove trash and
time between burning and milling. Etha
removal is quite efficient, but BOD levels ar
problem since concentration of non-volatiles is
predictable. The BOD problem reduces the use
ness of stripping, but it can be valuable in pro
ing relatively clean and sterile water for inte
factory uses and reducing the loading on non
effluent treatment systems. (Collins-FIRL)
W77-03601

TALL ORDER IN WASTE TREATMENT,
Chemical Week, Vol. 119, No. 19, p 67-68,
November 10, 1976.

Descriptors: *Waste water treatment, *Aerat
*Settling basins, *Aerobic bacteria, *Chemica
dustry, Capital costs, Treatment facilities, Ch
cal wastes, Sludge treatment, Bubbles.
Identifiers: *Tower biology treatment, *Oxy
utilization, Off-gas treatment.

Bayer AG Chemical Company of West Germ
developed a tower biology treatment system
waste water of chemical plants. In this syst
waste water and air enter the bottom of the
tower through special nozzles. The water is bro
into small bubbles which provide a greater sur
than usual surface aerators. Aerobic bacteria
secondary treatment sustain greater oxy
utilization with more than a 90% reduction
biochemical oxygen demand and suspended so
Power requirements of this system are
reduced. Treated wastes then spill into a set
basin at the tower top where sludge is remove
the bottom and treated water discharged in
river from the upper portion. An advantage of
system was shown to be better utilization of
ygen in the air stream. The column height is
main criteria of performance, but towers gre
than 100 ft provide no increased performa
worth the additional cost. A larger diameter ha
effect on efficiency. Unused oxygen in the B
tower system is 50% of that in injector-aer
horizontal basins. The greater oxygen utiliza
allows the use of less air and reduces exh
gases from the top of the tank. Savings result f
lower costs for gas treatment and lower incid
tor fuel requirements. Capital cost savings of
over that for horizontal basins are expected.
injector system is installed in groups of fou
rows at the tank bottom, one injector for each
21 sq ft of surface area. The settling basin is a
top to aid settling, but sludge is produced
slightly greater quantity than in horizontal ba
Bayer plans a full-scale operation at its Le
kusen, West Germany headquarters. (Co
FIRL)
W77-03602

**TREATMENT OF TROUBLESOME OD
FROM THE FERMENTATION OF
TIBIOTICS (ABBATTIMENTO DI OD
MOLESTI PROVENIENTI DALLA FERM
TAZIONE DI ANTIBIOTICI),**
C. Casalini, G. Mascellani, and V. Michelini.
Inquinamento, Vol. 18, No. 9, p 47-48, Septem
1976. 2 fig, 1 tab, 19 ref.

Descriptors: *Treatment, *Odor, *Ferments
*Antibiotics(Pesticides), *Oxygenation, W
Absorption, Hydrogen ion concentration.
Identifiers: Soda, Cephalosporin C.

Oxygenated water and soda can be used to ch
cally absorb troublesome odors from the fer
tation of cephalosporin C. The oxygenated w
is effective even at low concentrations (under
and at various pHs. In a batch ferment
process, the gas effluents successively
through 3.5% parts per volume oxygenated w
3.5% oxygenated water with hydrochloric ac

l and sulfuric acid at pH 3, 9-15% parts per
me soda, and 3.5% parts per volume
rochloric acid. Experimental results indicate
approximately 60-100 g/liter soda and 10-20
er oxygenated water are consumed during one
nentation cycle. Soda consumption is mainly
to the breakdown of carbon dioxide produced
fermentation while that of oxygenated water
ends on a number of factors (fluctuations in
fermentation process, pH, degree of contact
the effluent). Practically, this process could
sed in two-story wash towers operating on a
ntercurrent principle. (Waltner-FIRL)
7-03603

EMICAL-INDUSTRY COSTS OF WATER LLUTION ABATEMENT,
nd T, Arlington, Va.
ummings-Saxton.
mical Engineering, Vol. 83, No. 24, p 106-113,
ember 8, 1976. 2 fig, 7 tab.

criptors: *Chemical industry, *Waste water
tment, *Industrial plants, *Industrial produc-
, *Industrial wastes, *Chemical wastes, Water
ution, Costs, Economic impact, Water pollu-
control, Treatment facilities, Pollution abate-
t.

er pollution abatement in compliance with the
dards for effluent limitation in Public Law 92-
is discussed. Since not all companies incur the
e cost increase, and since they may have dif-
g degrees of flexibilty in allocating the cost of
ution abatement, price adjustment affects
petition within the industry. Abatement costs
a given chemical vary depending on the
ber, type, and production volume of other
ducts manufactured at the same facility. Water
ke per unit output has consistently declined in
chemical industry, with an accelerated reduc-
during 1968 to 1973. A chemical input-output
e (CIOT), a plant data matrix, and an estimate
bsolescence had to be developed to translate
plant-level costs into aggregate industry expen-
res. Sales for each chemical, both for produc-
of other chemicals and other applications, are
tified in the CIOT. Effluent standards will
ably result in a more rapid plant depreciation
e, because standards are presently only
tly more severe for new plants than for exist-
plants. Expenditures for water pollution abate-
t from 1973 to 1983 are estimated at 171% of
1975 planned total expenditures for new plants
equipment by the chemical industry. Yearly
s associated with Public Law 92-500 were esti-
ed at $4094 million by 1983. New facilities can
ily incorporate improved process designs that
mize residual generation. (Snyder-FIRL)
7-03604

E USE OF MACRORETICULAR POLYMER-ADSORBENTS FOR THE TREATMENT OF STE EFFLUENTS,
m and Haas Co., Philadelphia, Pa.
unin.
and Applied Chemistry, Vol. 46, No. 2-4,
. 15 fig, 5 tab, 4 ref.

criptors: *Polymers, *Adsorption, *Waste
r treatment, *Effluents, *Ions, *Ion
ange, Resins, Pores, Porosity, Porous media,
mical industry, Chemical wastes, Recycling.

gnificant advance in ion exchange resin and
rbent technology is the development of the
roreticular pore structure. Various synthetic
es exist for preparing both ion exchange resins
polymeric adsorbents of high surface area and
volume. Surface area and pore parameters
be varied over a wide range. Several
roreticular polymers based on the crosslinked
ne and acrylate systems are now commer-
y available. They are hard, durable, insoluble
res of high surface area and porosity. They
vailable in various polarities. When adsorbing from polar solvents, the nonpolar adsorbents are particularly effective for nonpolar solutes and polar adsorbents are very effective for polar solutes. Polymeric adsorbents are being studied for numerous applications, including treatment of waste effluents. The use of these polymeric adsorbents for the treatment of wastes from the petrochemical, chemical, dye, and paper manufacturing industries is of particular interest. It has been demonstrated in some instances that significant quantities of reusable chemicals can be recovered that more than pay for the waste treatment application. One such application is the use of the polymeric adsorbents for the treatment of phenolic wastes. The adsorbents are also used for the removal of chlorinated pesticides, TNT residues, and other noxious compounds from waste effluents and water supplies. (Snyder-FIRL)
W77-03605

PURIFICATION OF WINE DISTILLERY EFFLUENTS (EPURATION DES EFFLUENTS DE DISTILLERIES VINICOLES),
Industries Alimentaires et Agricoles, Vol. 93, p 906-908, July/August, 1976. 1 fig.

Descriptors: *Distillation, *Food processing industry, Industrial plants, *Industrial wastes, *Effluents, Treatment facilities, Neutralization, Coagulation, Flocculation, *Waste water treatment, Water purification.
Identifiers: *Wine distillery effluents, Flotation.

ERPAC has installed a dregs treatment plant at the wine distillery of the Vallee du Calavon a Maubec. Primary treatment involves neutralization, coagulation, flocculation, flotation , and separation of the flocculated substances from the clear effluent. Treatment consists of aeroflotation followed by compaction. The sludge contains 10% solids after flotation and 30% solids after compaction. It then passes into a rotary dryer to produce concentrated sludge pellets. The clear effluent is evaporated. (Waltner-FIRL)
W77-03606

NESTLE AND POLLUTION CONTROL,
Water and Waste Treatment, Vol. 19, No. 9, p 47-48, September, 1976.

Descriptors: *Waste water treatment, *Sewerage, *Biochemical oxygen demand, *Treatment facilities, *Water pollution control, Industrial plants, Food processing industry, Color, Waste water(Pollution).

The Nestle Company installed a waste water treatment system in its Freehold, New Jersey, coffee plant which reduces the BOD and removes the color of waste water. The system consists of a boiler which generates 100,000 lb/hr saturated steam. Coffee grounds are fired at 60 to 66% moisture. The boiler design allows coffee grounds to be burned below the oil firing line so that waste gases from the grounds will be consumed. Fly ash collectors further reduce contamination from this source. The steam produced is recycled to heat water used in coffee production. When the state instituted a regional waste disposal program as well as the addition of a reservoir, stream standards were upgraded. This caused a problem in that the waste water was then too dark. Increased loads also became too much for the local municipal treatment plant. The company installed a separate sewage system to separate industrial waste from the total flow to the local plant. These wastes were directed to sand lagoons near the treatment plant, but it was found that they were on low land with little drainage. This problem was solved by diverting the colored water to a spray system and a multiple effect evaporating system that takes preconcentrated wastes mixed with oil and evaporated to dryness. The product is separated from the oil and burned in the previously mentioned boiler. The resultant water is then treated at the local treatment plant during off-peak hours. (Collins-FIRL)
W77-03607

TREATMENT OF PUTREFACTIVE MEAT AND FISH WASTE -- FOR PREPARATION OF MANURE, ANIMAL FEEDS AND FUEL OIL,
Belgian Patent BE-842-053. Issued Sept. 16, 1976. Derwent Belgian Patents Report, Vol. X, No. 41, p D3, November 17, 1976.

Descriptors: *Industrial wastes, *Patents, *Treatment facilities, *Waste water treatment, *Fertilizers, Oil, Equipment, Odor, Food processing industry, *Feeds.

A process and apparatus to treat putrefactive waste from raw fish and meat was patented. It can treat such material rapidly without causing odor. The waste from domestic or industrial kitchens moves between grinding rollers and into a chute, then to an endless screw type grinder. Solids are separated and move through dehydrating rollers to an ultraviolet sterilizing chamber; they are dried by hot air in a perforated drum on their way to a receptacle. The separated liquid flows to a stirrer where a deodorizing liquid is added to the mixture, goes to a header tank, and then to a concentrating tank where the pressure is reduced. Oil and water are separated by centrifugation and flow to separate reservoirs. The by-products may be used as fertilizer or animal feed. The oil recovered can be burned as fuel; the water can be further purified. (Snyder-FIRL)
W77-03608

PILOT SCALE HIGH GRADIENT MAGNETIC FILTRATION OF STEEL MILL WASTEWATER,
Sala Magnetics, Inc., Cambridge, Mass.
J. R. Harland, L. Nilsson, and M. Wallin.
IEEE Transactions on Magnetics, Vol. MAG-12, No. 6, p 904-906, November, 1976. 5 fig, 4 ref.

Descriptors: *Waste water treatment, *Separation techniques, *Suspended solids, *Steel, *Pilot plants, Filters, Recycling, Magnetic studies, Oil wastes, Mills.
Identifiers: *Magnetic filtration, Flow velocity, Hot rolling steel mills.

The removal of fine suspended solids in waste water of a steel mill was tested in a pilot project. A full-scale facility would consist of two filters operating in parallel. Waste water would be pumped through the filter matrix where solids are removed. The treated water could be recycled or discharged. The theory of operation suggests that ferro- or para-magnetic particles are removed when high magnetic fields develop near the surface of filamentary ferromagnetic fibers which make up the filter bed. Pilot tests studied flow velocity and the background magnetic field of the separator matrix. It was shown that cycle length is proportionally shorter as flow velocity increases and increases when the magnetic field increases. The system traps more solids than a sand filter. A large amount of oil is removed since lubricating oils in rolling mills coat metal and metal oxide surfaces. Oil removal is more efficient with higher initial solids concentration. It takes about 20% of the water used to flush a sand filter to flush the high gradient magnetic separator. The advantages of the system are high flow velocity and low space requirements, useful in upgrading mills where space is limited; no need for chemicals as with clarifiers; no need for major pretreatment; and no moving parts which reduce maintenance costs. (Collins-FIRL)
W77-03609

REVERSE OSMOSIS FOR THE TREATMENT OF METAL WASTE SOLUTIONS,
Department of Energy, Mines and Resources, Ottawa (Ontario). Extraction Metallurgy Div.
V. S. Sastri.
Journal of Scientific and Industrial Research, Vol. 35, No. 2, p 88-90, February, 1976. 37 ref.

Descriptors: *Reverse osmosis, *Waste water treatment, *Capillary action, *Pores, *Membranes, Surfaces, Salts, Pressure.

Principles and applications of reverse osmosis applied to the treatment of metal waste solutions are considered. There are two basic schools relative to reverse osmosis. One is that capillary flow mechanism is linked to the appropriate chemical nature and the existence of pores of appropriate size on the membrane surface. Because of the physico-chemical interaction of the membrane and solution, salt rejection is effected and water can be removed under pressure through the membrane capillaries. The second is that the solution-diffusion mechanism requires that solute and solvent dissolve in the membrane and permeate through the nonporous surface layer by homogeneous diffusion. The second approach is limited in its success. Physico-chemical criteria for ion separation are not completely developed. Several factors which affect the stability of membranes are hydrolysis, pressure, bacteria, temperature, and surface coating. Reverse osmosis can be applied in the treatment of electroplating waste solutions in water pollution control and metal recovery, in the treatment of acid mine water, and in processing solutions of several solutions used in photographic processing plants for chemical recovery. Suggestions were made for future investigations. (Collins-FIRL)
W77-03610

SOLIDIFYING SLUDGE CONTAINING HEAVY METALS -- BY TREATING WITH SULPHUR COMPOUNDS, COLLOIDAL SULPHUR AND BITUMINOUS EMULSION.
French Patent FR 2292-674. Issued July 30, 1976.
Derwent French Patents Abstracts Vol. X, No. 41, p D6, November 17, 1976.

Descriptors: *Sludge, *Sludge treatment, *Heavy metals, *Sulfur compounds, *Sulfur, .Colloids, Emulsions, *Patents.

A process was patented that includes adding a sulfur compound or compounds, a bituminous emulsion, and colloidal sulfur to sludge that contains harmful substances like heavy metals or arsenic for aggregating and solidifying it. Harmful substances such as arsenic and heavy metals, whether hard to dissolve or soluble in water, are made hard to solve or insoluble by adding colloid sulfur, the sulfur compound, or aggregating force of abituminous emulsion and then separated from water. The separated solids are compactly combined and do not collapse in water, so it can be used as reclamation material or water-preventive wall material. (Snyder-FIRL)
W77-03611

CONTINUOUS BOWL-TYPE CENTRIFUGES FOR THE CLARIFICATION AND DEHYDRATION OF SLUDGES FROM THE PAPER INDUSTRY (CENTRIFUGEUSES CONTINUES A BOL PLEIN POUR CLARIFICATION ET DESHYDRATION DES BOUES DANS L'INDUSTRIE PAPETIERE).
Papier, Carton et Cellulose, No. 10, p 68-70, October, 1976. 4 fig.

Descriptors: *Centrifugation, *Dehydration, *Sludge, Pulp and paper industry, *Industrial wastes, Biological treatment, Treatment facilities, Effluents, *Waste water treatment, Pulp wastes.
Identifiers: Clarification.

Sludges resulting from the physiochemical or biological treatment of paper effluents must be dehydrated for storage. The bowl-type centrifuge with endless screw can clarify and dehydrate any type of primary and most primary-secondary sludges (paper paste, biological, and drinking sludges). The addition of flocculants such as polyelectrolytes makes the process 99% effective. Turbulence has been eliminated by replacing counter-current flow with parallel flow where the sediments and clarified water move through the cylinder in the same direction, separate without turbulence, and are then directed into separate channels. The advantages of a bowl-type centrifuge include continuous processing, no filters, large loads, and savings in energy, space, and wear. (Waltner-FIRL)
W77-03613

CHARACTERISTICS OF EFFLUENTS FROM CONVENTIONAL AND OXYGEN BLEACHING SEQUENCES,
National Council for Air and Stream Improvement, Gainesville, Fla. Southern Research Center.
For primary bibliographic entry see Field 5A.
W77-03614

POTENTIALS OF USING SPENT OXYGEN BLEACHING LIQUOR IN THE SULPHITE PROCESS,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Tsellyulozno-Bumazhnoi Promyshelennosti, Leningrad (USSR).
G. L. Akim, T. A. Bystrova, L. D. Zonova, and I. M. Uljantseva.
Svensk Papperstidning, Vol. 79, No. 14, p 466-479, October, 1976. 6 tab.

Descriptors: *Pulp and paper industry, *Waste water treatment, *Industrial wastes, *Bleaching wastes, Biochemical oxygen demand, Pollution abatement, Liquid wastes, Recycling, Color.
Identifiers: Alkali-oxygen stage.

In paper production, it was shown that spent bleach liquors from the alkali-oxygen stage could be used for the preparation of sulphite cooking acid for rayon pulp from hardwood and softwood. It was most suitable as a prebleaching stage for sulfite pulps and can replace the chlorination and extraction stages. This proved to be an efficient pollution abatement procedure. It eliminated effluents from the chlorination stages; caused an absence of dark colored products from conventional bleaching procedures; and reduced the number of final bleaching stages, reagent consumption, and the amount of organic substances in the final bleaching process. As a base for the cooking acid, the alkali-oxygen spent liquors produce a high-grade pulp. Alkali-oxygen spent liquors have higher values of oxidizability, biological oxygen demand, chemical oxygen demand and color index. With biochemical processing, hypochlorite stage and acid treatment waste waters, as well as 5% of spent liquors enter the drain for disposal. Biological purification is more efficient here than with conventional bleaching procedures. The organic matter from this liquor may be used to neutralize the spent liquor and incubate yeast in combination with the sulfite liquor. (Collins-FIRL)
W77-03615

SOLVENT AND SOLVENCY -- A SOLUTION TO SLUDGE PROBLEMS,
D. Moraski.
Canadian Pulp and Paper Industry, Vol. 29, No. 11, p 36-37, November, 1976. 2 tab.

Descriptors: Pulp and paper industry, *Waste water treatment, *Solvents, *Sludge, *Industrial wastes, Waste water(Pollution), Sludge disposal, Pulp wastes, Recycling, *Sewage treatment, *Pulp wastes.

As a result of requirements on the pulp and paper industry to remove greater amount of solids from waste water, the quantity and variety of sludges has grown enormously to create an immense and immensely expensive waste disposal problem. One plant handling 35 dry tons/day of primary sludges in 1970 handles 50 dry tons/day of primary and secondary sludges in 1976. Dewatering, drying, and disposal methods designed with cheaper fuel and lower environmental awareness often have drawbacks including high operating costs, in adequate capacity, negative environmental im pact, and inability to handle the low-solids, hard to-filter sludges produced in secondary treatment B.E.S.T. (Basic Extractive Sludge Treatment capitalizes on the special properties of the solven triethylmine (TEA) to improve sludge dewatering TEA and water mix completely below 18C; whe warmed, however, they form two distinct an easily separated layers. At approximately -7C, th solvent greatly enhances the ability of the solid particles to separate from the water in which the are bound. In most cases, the value of the drie sludge as a fuel is substantially greater than th total energy costs of the B.E.S.T. system. Becaus solvent replaces a high percentage of the water i the wet cake, and because TEA evaporatio requires only 133 BTUs per lb, compared wi 1000 BTUs per lb of water, final drying is quick and less expensive. After drying, the solvent collected and reused. Filtration rates for TEA treated samples are appreciably greater than thos for untreated samples. Where B.E.S.T. is used t process 50 dry tons/day sludge containing 20% solids, the fuel value of the product equals approx imately $28.80 per dry ton. (Snyder-FIRL)
W77-03616

PURIFYING AND REGENERATING GASEOU AND FLUID PHASE EFFLUENTS -- SUCH A AMMONIA MIXTURES FROM WOO PROCESSING, MERCERISING ETC.
French Patent FR 2292-503. Issued July 30, 197
Derwent French Patents Report, Vol. X, No. 41, J1, November 17, 1976.

Descriptors: *Patents, *Gases, *Effluent *Ammonia, *Industrial wastes, Industries, Liqu wastes, Distillation, *Waste water treatment.

A process involving several interconnected ste is patented to purify industrial waste effluent ha ing at least two phases, one liquid and the oth gaseous. The gas phase is converted to a liqu phase; liquid phases are fractionally distilled to e tract pure vaporized substances. Each of the pu substances is condensed to liquid state; the dist lates are collected separately to form separa stock, usable as internal feed-back primer, f fractional distillation; part of or all condensate removed and cooled by heat exchange before co lection. Where the gas is a mixture its density m be increased before it is passed through a colum in counterflow with an absorbent fluid or solven to separate all impurities. Then the solution is fra tionally distilled, and the absorbent or solve recovered, topped up with new material, and rec cled. The distillate can be heated to the boili point for vaporization by heat exchange. Befo distilling each fluid phase, pressure may b mechanically raised so that gaseous distillate c condense at ambinent temperature. Under hi pressure this gaseous distillate may be detente simultaneously vaporizing the part that is mixed gaseous form with the gas being cooled. The pla is inexpensive to set up and run. It is fully aut matic, requiring very little maintenance and supe vision. (Snyder-FIRL)
W77-03617

EVALUATION OF WASTEWATER TREA MENT FACILITIES.
Industrial Water Engineering, Vol. 13, No. 4, p 2 33, August/September, 1976. 3 fig, 7 tab.

Descriptors: *Treatment facilities, *Industr wastes, *Waste water treatment, *Textile *Chemical industry, Energy, Design, Cost Evaluation.
Identifiers: Zero discharge, Facilities upgrading.

A systematic/integrated approach was recom mended for evaluating waste water treatme facilities, as applied to both chemical and text plants. The basic elements of this approach a design of industrial waste water systems and t

tion of these systems. The eventual target of programs should be zero-discharge, but due huge economic requirements of this ideal, nievement is not mandatory. Other aspects of em evaluation include selection of the treat- process after determining system needs gh an energy audit; the next step involves aring feasible alternatives. Consideration l also be given to energy requirements, n design and current condition of equipment, ting procedures, and operating policies. This que was applied to a textile plant which was ed to upgrade its treatment facilities. Cor- e action involved a reduction in water con- ion, preheating boiler feedwater from a water stream, and insulation of steam, con- te, and hot water mains. The results were a vings in overall plant costs after the upgrad- the treatment system. (Collins-FIRL)
)3619

ANT, OUTSIDE POLLUTION EVILS, GY SAVING TOP AATCC CONCERNS.
imary bibliographic entry see Field 5G.
)3620

W LABORATORY DEVICE FOR WASTE ER ANALYSES (RESPIROMETER). PART EASUREMENTS WITH BATCH OPERA- (UJ LABORATORIUMI SZENNYVISVIZ- O KESZULEK (RESPIROMETER) II. . MERESEK SZAKASZOS UZEMMOD LETT),
imary bibliographic entry see Field 5A.
)3621

ION 208 PROGRAM REVIEW, RONMENTAL PROTECTION AGENCY), FT).
onmental Protection Agency, Washington, Program Evaluation Div.
ible from the National Technical Informa- ervice, Springfield, VA 22161, as PB-250 Price codes: A04 in paper copy, A01 in fiche. December 12, 1975, 48 p.

iptors: *Federal Water Pollution Control Water treatment, *Administrative agencies, governments, Governmental interrelations, ation, Water pollution, Treatment, Waste treatment, Quality control, Water pollution l, Water quality, Wastes, Waste treatment, aspects, Federal jurisdiction, Planning, management(Applied), Budgeting, Ad- ration.

n 208 of the Federal Water Pollution Control mendments of 1972 was promulgated to the development and implementation of ide waste treatment management plans. At quest of the Office of Water Planning and ards, the Program Evaluation Division un- k a review under Section 208. The Division ded that most grantees will not be able to ete all of the complex planning tasks de- d by Section 208 in the time allotted for ation of the initial plan. The following s were given: (1) expectations for the pro- were overly ambitious; (2) many of the l agencies lacked appropriate staff, or- tion and experience in the water pollution 3) practical limitations on what can be ac- shed at the local level through areawide ng; and (4) inherent constraints in the tion. The Section 208 program has a high ial for the dissipation of meager resources in rsuit of complex objectives. The success of gram depends on EPA's ability to focus the of grantees through a clearer definition of gram requirements. (Cowart-Florida)
3686

BPT: CONSIDER THE ALTERNATIVES (BEST PRACTICAL TREATMENT CRITERION).
Journal Water Pollution Control Federation. Vol 46, No 5, p 808-810 May 1974. 3 p.

Descriptors: *Waste water treatment, *Waste water(Pollution), *Waste water disposal, *Waste disposal, *Water quality standards, Water quality control, Water purification, Water resources, Water reuse, Water law, Treatment facilities, Treatment, Technology, Environmental engineering, Environmental control.
Identifiers: *Administrative regulations.

The 'best practicable treatment' concept (BPT) will soon be a major determinant in the funding of publicly owned wastewater treatment projects and in the processing of applications for discharge permits. Evaluated in this area is the Environmental Protection Agency (EPA) report concerning BPT. No definitive guidelines as to what treatment qualifies as BPT were given by EPA; instead, the report examined three technological approaches. These were: land utilization and land application; treatment and discharge; and reuse technology. A municipality, in order to qualify for federal funds, must use the report to choose its own alternative treatment approach but must also follow the cost-effectiveness regulations. Emphasis is placed upon land treatment techniques along with an in depth discussion of the costs and capabilities of land treatment. The EPA report also concentrates on what may be the three water quality problems likely to remain after the application of the 1977 secondary treatment controls: oxygen-demanding materials, nutrients, and fecal coliform. BPT can not be set for reuse projects and any criteria for such will be determined by the medium into which reused water is ultimately discharged. (Welch-Florida)
W77-03690

THE POTENTIAL FOR NUCLEAR AND GEOTHERMAL POWER PLANT SITING IN IDAHO AS RELATED TO WATER RESOURCES,
Idaho University, Moscow, Dept of Civil Engineering.
For primary bibliographic entry see Field 3E.
W77-03730

DESIGN AND OPERATIONAL CRITERIA FOR THICKENING OF BIOLOGICAL SLUDGES,
Clemson Univ., S. C. Dept. of Environmental Systems Engineering.
T. M. Keinath.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 967, Price codes: A04 in paper copy, A01 in microfiche. South Carolina Water Resources Research Institute, Clemson, Report No. 62, September 1976. 63 p, 35 fig, 6 tab, 22 ref. S-051-SC.

Descriptors: *Activated sludge, Waste water treatment, Costs, Sedimentation, Designs, Operations, Design criteria, Biological treatment, Sludge treatment, Aeration, Settling basins, Capital costs, Operating costs.
Identifiers: Clarification, Thickening.

A unique procedure for designing and operating the activated sludge aeration basin/clarifier system is developed using the settling flux approach. A least-cost design procedure, utilizing batch settling tests and the state point concept, produces a design solution which minimizes capital and operational costs. In addition, the settling flux approach provides the plant operator with a tool for control and operation of the clarifier/thickener to improve treatment efficiencies and prevent operational failures.
W77-03734

HYGIENIC ASSESSMENT OF THE DESTRUCTION PRODUCTS OF SURFACTANTS IN WATER OZONIZATION, (IN RUSSIAN),
Moskovskii Gosudarstvennyi Meditsinskii Institut (I) (USSR). Dept. of Public Hygiene.
A. A. Korolev, M. V. Bogdanov, and B. R. Vitvitskaya.
Gig Sanit 1, p 16-20, 1975.

Descriptors: *Toxicity, Public health, Water pollution, *Surfactants, *Ozone, *Potable water, Organoleptic properties, *Waste water treatment, *Water treatment.
Identifiers: *Ozonization.

In the course of ozonization of water contaminated with surface active agents at concentrations above 2-3 mg/l, destruction products are formed, as the result of which the water acquires odors. The products of ozone destruction of surface active agents are less toxic and less cumulative than the original agents and they have no allergenic properties. The organoleptic index (the smell) should be considered as the most important on in hygienic assessment of water containing products of ozone destruction of surface active agents. This study is applicable to drinking water for humans. Tests were done in rats and mice.--Copyright 1976, Biological Abstracts, Inc.
W77-03772

DEVELOPMENT DOCUMENT FOR EFFLUENT LIMITATIONS GUIDELINES AND NEW SOURCE PERFORMANCE STANDARDS FOR THE COPPER, NICKEL, CHROMIUM, AND ZINC SEGMENT OF THE ELECTROPLATING POINT SOURCE CATEGORY,
Environmental Protection Agency, Washington, D. C. Effluent Guidelines Div.
For primary bibliographic entry see Field 5G.
W77-03775

PURIFICATION OF EFFLUENTS FROM THE MANUFACTURE OF PAPER AND BOARD BY ELECTROCHEMICAL METHOD (OCHISTKA STOCHNYKH VOD KARTONNOGO-BUMAZHNOGO PROIZVODSTVA ELEKTROKHIMICHESKIM METODOM),
Ukrainskii Nauchno-Issledovatelskii Institut Bumagi, Kiev, (USSR).
V. G. Selivanov, V. P. Svitel'skii, V. G. Ryumin, and N. V. Samborskii.
Bumazhnaya Promyshlennost, No. 8, p 24-25, August, 1976. 1 fig.

Descriptors: *Pulp wastes, *Waste water treatment, *Electrochemistry, Wastes, Industrial wastes, Waste treatment, Water pollution treatment, Water pollution sources, Electrodes, Stainless steel, Oxygen, Hydrogen, Chlorine, Cathodes, Anodes, Coagulation, Suspended solids, Flotation, Disinfection, Chemical oxygen demand, Biochemical oxygen demand, Microbiology, Energy, Pulp and paper industry, Effluents.
Identifiers: Graphite, White water(Paper machines), Fiber recovery.

The purification equipment for white water described consists of a unit for two-stage mechanical and electrochemical fractionation (recovery of fibers and removal of finely dispersed and colloidal particles, respectively) and a clarifier unit equipped with an assembly of graphite anodes and stainless steel cathodes. This unit operates with direct current through a rectifier at 14-15 volts, 40-50 amperes, and a current density of 20-30 milliamperes/sq cm. The flow rate is 0.8 m/hr. Hydrogen is evolved at the cathode, oxygen and chlorine at the anode, and there is a continuous upward stream of gases which causes flotation of the suspended solids. Simultaneously, there is electrocoagultion with formation of particle flocks. An electric precipitator is mounted at the outlet to retain the flocks. The white water is also disinfected by the action of atomic oxygen and

chlorine. Analyses have shown reductions of the suspended solids content to 2-4 mg/liter, of COD by up to 64%, of BOD by up to 69%, and of microbial count by 99%. The energy consumption for the treatment of 1 cu m of white water is approximately 1 kw/hr. (Stapinski-IPC)
W77-03789

REDUCTION OF FRESH WATER CONSUMPTION AT THE KONDOPOGA MILL FOR THE MANUFACTURE OF PULP (OPYT RABOTY KONDOPOZHNOGO KOMBINATA PO COKRASHCHENIYU RASCHODA SVEZHEI VODY V TSELLYULOZNOM PROIZVODSTVE),
Kondopozhskii Kombinat (USSR).
For primary bibliographic entry see Field 3E.
W77-03790

MANUFACTURE OF BOXBOARD IN A CLOSED WATER CYCLE (PROIZVODSTVO KOROBOCHNOGO KARTONA PRI ZAMKNUTOM VODOOBOROTE),
Suoyarvskaya Kartonnaya Fabrika (USSR).
For primary bibliographic entry see Field 3E.
W77-03791

PURIFICATION OF TECHNICAL PAPER MILL EFFLUENTS (OCHISTKA STOCHNYKH VOD FABRIKI TEKHNICHESKIKH BUMAG),
Ukrainskii Nauchno-Issledovatelskii Institut Bumagi, Kiev (USSR).
V. P. Svitel'skii, R. P. Ptitsa, V. A. Kovba, T. D. Sokirko, and D. A. Samsonov.
Bumazhnaya Promyshlennost No. 7, p 23-25, July, 1976. 2 fig, 2 tab.

Descriptors: *Pulp wastes, *Waste water treatment, Wastes, Industrial wastes, Waste treatment, Water pollution treatment, Water pollution sources, Sedimetation, Filtration, Coagulation, Flocculation, Lime, Foreign countries, Suspended solids, Dissolved solids, Effluents, Pulp and paper industry, Water pollution control, Dyes.
Identifiers: Aluminum sulfate, Polyacrylamide, Colored papers, *USSR.

Effluents from the Koryukovka mill (USSR), whicl produces polyethylene-treated papers, colored papers, and corrosion-inhibitor papers, contain fillers, dyes, emulsifiers, stabilizers, binders, and other chemicals. Effluents from the manufacture of corrosion-inhibitor papers are burned. The other effluents are subjected to mechanical clarification (sedimentation) and filtration through sand filters. A study was conducted by the Ukrainian Research Institute of the Pulp and Paper Industry to develop a suitable method for treatment of the highly polluted effluents, particularly effluents from the manufacture of colored papers. Tests with various coagulants and flocculants were conducted. The best results were obtained by treatment with lime, aluminum sulfate, and polyacrylamide in amounts of 150, 150, and 4 mg/liter, respectively. When treated by this sequence, the purified effluents had a suspended solids content of 10-30 mg/liter, dissolved substances content of 600-650 mg/liter, and an oxidizability of 42-52 mg oxygen/liter. Such a treatment should constitute only the first purification stage and should be followed by biological purification. (Stapinski-IPC)
W77-03792

A SCHEME FOR EFFECTIVE CONTROL OF EFFLUENT PH,
Celanese Chemical Co., Bishop, Tex.
A. A. Iverson, and S. Ochisi.
Instrument Society of America, Advances in Instrumentation, Annual Conference (Houston, Texas), Vol. 31, Part 4, Paper No. 861, 5 p, ISA (Pittsburgh), October 11-14, 1976. 8 fig, 12 ref, 1 tab.

Descriptors: *Hydrogen ion concentration, *Effluents, *Control systems, *Automatic control, Monitoring, Regulation, Instrumentation, Waste water treatment, Wastes, Waste treatment, Water pollution treatment, Industrial wastes, Chemical industry, Diffusion, Discharge(Water).
Identifiers: Sulfuric acid.

An automatic pH control system has been designed for effluent streams flowing in a canal system inside a chemical plant. At one location, sulfuric acid is added to the stream, and a pH probe is placed ca. 250 m downstream. A cascade control system incorporating a nonlinear controller is used to manipulate the acid flow rate. The diffusion characteristics of a flowing stream are used in lieu of forced mixing. A second pH sensor, used as an effluent monitor, is located ca. 1 km downstream of this control system. By using this system, the effluent has met applicable pH specifications prior to being discharged outside the plant. (Brown-IPC)
W77-03802

DESIGN OF AN EFFICIENT WATER SYSTEM FOR A KRAFT PULP MILL,
Main (Charles T.), Inc., Boston Mass.
J. S. Lunde.
TAPPI Engineering Conference, Houston, October 4-7, 1976, Preprinted Proceedings Book I (TAPPI, Atlanta, Ga.), p 217-222. 3 fig.

Descriptors: *Water conservation, *Pulp and paper industry, *Water reuse, Costs, Economics, Recycling, Waste water treatment, Steam, Water consumption(Except consumptive use), Industrial water, Water management(Applied), Water utilization, Effluents.
Identifiers: *Kraft mills.

For a long time the conservation and reuse of water at kraft pulp mills was not practiced because of high capital and operating costs. At present, due to rising energy costs and environmental constraints, efficient reuse and recycling of water streams can be advantageous, because it can reduce overall water consumption, minimize effluent volumes to be treated, and optimize low-level heat recovery, thereby decreasing steam usage. Quantitative and qualitative methods used to design an efficient water reuse system are analyzed, and examples are given of alternate modes of operation of unit processes and how they can affect the overall water, steam, and effluent streams. (Witt-IPC)
W77-03804

CHLORINE-BASED BLEACHERY EFFLUENT TREATMENT,
Champion International Corp., Stamford, Conn.
H. A. Fremont.
United States Patent No. 3,986,951. October 19, 1976, 5 p. 2 fig, 5 claims, 2 tab.

Descriptors: *Bleaching wastes, *Waste water treatment, *Patents, Wastes, Industrial wastes, Water pollution treatment, Water pollution control, Chemical precipitation, Aluminum, Ions, Suspended solids, Organic compounds, Electrodialysis, Separation techniques, Sodium chloride, Chlorine, Water pollution sources, Waste treatment, Chlorides, Sodium compounds.
Identifiers: Sodium hypochlorite, Sodium hydroxide.

A method is provided for treating the effluent from a pulp-bleaching system which uses only a chlorine compound and sodium salts. The process involves adding aluminum ion (e.g., as aluminum chloride) to the effluent in an amount sufficient to precipitate all of the organic materials and suspended solids; separating the solids from the effluent; electrodialyzing the effluent to provide two effluent streams, one containing 200-600 ppm sodium chloride which can be returned to the bleach plant, and a second concentrated stream containing 5-10% by weight sodium chlorid evaporating the concentrated stream to about 25 sodium chloride, and electrodialyzing the concen trated solution to produce chlorine gas, sodiu hypochlorite, and sodium hydroxide. (Lynch-IPC W77-03806

A SURVEY OF PULP AND PAPER INDUSTR ENVIRONMENTAL PROTECTION EXPEND TURES AND OPERATING COSTS - 1975,
National Council of the Paper Industry for Air a Stream Improvement, Inc., New York.
R. O. Blosser.
NCASI Special Report No. 76-05, 14 p, June, 197 4 tab.

Descriptors: *Pulp and paper industry, *Air poll tion, *Water pollution control, *Cos *Environmental control *Environmental enginee ing, *Treatment facilities, *United State *Expenditures, *Pollution abatement, *Operati costs, Capital costs, Economics, Waste treatme Waste water treatment, Research and develo ment, Surveys, Data collections.

This report summarizes the findings of the N tional Council's survey of industry expenditur during 1975 for air and water pollution control a solid waste disposal. Capital expenditures en sioned for 1976 through 1978 are projected. Info mation is given on amortization, tax relief, a financing of pollution-abatement equipment a facilities. In 1975, a total of $706,000,000 we spent in operating, fixed, administrative, a research costs for environmental protection. On 1975 production basis, these costs exceeded $ per ton of paper and paperboard manufacture which is approximately 25% more than was spe in 1974. (Witt-IPC)
W77-03807

GREAT LAKES (PAPER CO.) PIONEE TOMORROW'S TECHNOLOGY,
F. Stevens.
Pulp and Paper Canada, Vol. 77, No. 11, p 27-3 35-36, 38-39, 42, 45-46, 49-50, November, 1976. fig, 10 illus.

Descriptors: *Pulp wastes, *Water conservatio *Water pollution control, *Canada, Foreign cou tries, Pollution abatement, Water reu Recycling, History, *Pulp and paper industr Treatment facilities, Great Lakes, *Lake Superi Identifiers: *Kraft mills, Closed system *Thunder Bay(Ont).

A detailed illustrated description is given of t No. 2 kraft mill at Great Lakes Paper Co. (Thund Bay, Ontario), scheduled for startup November/December, 1976, which incorporat numerous modern technological features, notab the Rapson-Reeve closed-cycle system f eliminating water pollution. The engineeri development of these innovations and the histo cal background of the installation are outline (Brown-IPC)
W77-03809

PREPARATION OF FERTILIZERS FROM E FLUENT SLUDGES OF FERMENTATIO PLANTS (POLUCHENIE UDOBRENII SHLAMOVYKH OTKHODOV GIDROLIZNOG PROIZVODSTVA),
For primary bibliographic entry see Field 5E.
W77-03810

PURIFICATION OF RESIDUAL LIQUOR FRO YEAST PRODUCTION (OCHISTK POSLEDROZHZHEVOI BRAZHKI),
L. I. Solov'eva, O. V. Kazakevich, and L. F. Sekretareva.
Gidroliznaya i Lesokhimicheskaya Promyshle nost, No. 6, p 14-16, 1976. 1 fig, 4 tab.

tors: *Yeasts, *Waste water treatment, ical treatment, Wastes, Industrial wastes, treatment, Activated sludge, Aeration, Biochemical oxygen demand, Water pollu- eatment, Water pollution sources, Water n control, Economics, Water pollution, rganisms, Treatment facilities, Fermenta- fluents, Oxidation.
ers: Trichosporon cutaneum, Fermentation y.

l liquor from yeast cultivation constitutes the effluents of the Lesozavod biochemical nd contains 85% of the total BOD load. In a f the best means to purify the residual three methods were tested, namely, air , activated sludge treatment, and nical oxidation with a pure culture of poron cutaneum isolated from the mixed ora of the yeast-growing tanks. Only a eduction of the liquor oxidizability could be d by the two first methods. Oxidation with gus under laboratory conditions reduced dizability 38-45% and the 5-day BOD 42%. ndustrial conditions, with continuous flow residual liquor through the Trichosporon the reduction of the 5-day BOD (initially 00 mg) was 50-70%, the reduction of ox- ity 20-30. The procedure for isolation and ion of the fungus and the biochemical ox- process are described. This method of pu- n requires no special investments, as the equipment of the yeast-producing plant is Contamination of the equipment is ed by sterilization of the fungus-containing ith chlorine. (Stapinski-IPC)
811

ETIC FLOCCULANTS FOR THE PU- TION OF KRAFT MILL EFFLUENTS TICHESKIE FLOKULYANTY DLYA TKI STOCHNYKH VOD SUL'FATNO- YULOZNOGO PROIZVODSTVA),
orosteleva, N. P. Dymarchuk, V. P. ov, and M. M. Krunchak.
nnaya Promyshlennost, No. 9, p 21-22, ber, 1976. 2 fig, 2 tab.

tors: *Flocculation, *Pulp wastes, *Waste eatment, Wastes, Industrial wastes, Waste nt, Pulp and paper industry, Effluents, purification, Chemical precipitation, rs, Chemicals, Organic compounds, Water n control, Water pollution treatment, ollution sources.
ers: *Polyacrylamide, Molecular weight, yl groups, Aluminum sulfate.

ylamide (PAA) is widely used as a floccu- the purification of kraft pulping effluents nite water. However, commercial PAA tions differ in their molecular weight and ntent of carboxyl groups. To determine the nents for PAA as a flocculant, its floccu- ffectiveness was studied as a function of ecular weitht and carboxyl group content. dy was conducted on a model kraft mill ef- using 12.6 mg/liter aluminum sulfate as the nt, and 10 PAA preparations including 6 tions obtained in the laboratory under con- excluding the presence of carboxyl groups ing molecular weights from 1.68 to 4.75 and 4 commercial preparations with ar weights from 1.02 to 3.0 million and a l content of 7.3-13%. The dose of PAA ied from 5 to 35 mg/liter. According to the PAA suitable as a flocculant of kraft mill s should have a molecular weight of 0-6,000,000 (intrinsic viscosity 10.4-12.7 nd contain not more than 10% carboxyl The optimum dose of PAA depends on the ar weight and the degree of hydrolysis, generally lower for preparations of high ar weight. (Stapinski-IPC)
812

AERATED PONDS FOR FINAL PURIFICATION OF WOOD CHEMICAL PLANT EFFLUENTS (AERIRUEMYE PRUDY DLYA DOOCHISTKI STOKOB LESOKHIMICHESKIKH PREDPRIYATII),
G. S. Kudryavtsev, N. K. Molodtsov, M. F. Morozov, and P. S. Fokin.
Gidroliznaya i Lesokhimicheskaya Promyshlennost, No. 6, p 19-21, 1976. 1 fig, 3 ref.

Descriptors: *Pulp wastes, *Waste water treatment, *Aeration, Wastes, Industrial wastes, Biochemical oxygen demand, Chemical industry, Water pollution sources, Water pollution treatment, Water purification, *Aerated lagoons, Sedimentation, Operation and maintenance, Treatment facilities, Phenols, Suspended solids, Costs, Operating costs, Capital costs, Effluents, Foreign countries, Pulp and paper industry.
Identifiers: *Wood industry, *USSR.

A 5-day BOD of over 10 mg/liter is too high for industrial effluents that have been purified biochemically. Such effluents should be subjected to additional purification. For example, biologically purified effluents of the Arkhangel'sk pulp and paper mill and the Bratsk wood-processing complex (USSR) have a 5-day BOD of 12-17 mg/liter; those of the Ashinsk and Syava wood chemical plants have a 5-day BOD of 30-45 and 10-20 mg/liter, respectively. Additional purification can be achieved by physical, chemical, physicochemical, and biological methods. The first three require complex equipment, expensive chemicals, high capital investments, and are costly to operate. For this reason, pilot-plant experiments were conducted at the Syava plant using the biochemical method, i.e., additional purification in aerated ponds. The plant effluent from the secondary sedimentation tanks passed to an aeration chamber where it was aerated for 20 min with compressed air. The aerated effluent was then directed into two parallel ponds, each consisting of a sedimentation section and three oxidation sections. The construction of the ponds is illustrated and their operation is described. This treatment reduced the BOD by 48%, volatile phenols by 50%, and suspended solids by 67%. The cost of the industrial equipment is estimated at 7.5% of the cost of the existing purification equipment, and the increase of operating costs at about 16%. (Stapinski-IPC)
W77-03813

USE OF EFFLUENTS FROM FERMENTATION PLANTS FOR FIELD IRRIGATION (ISPOL'ZOVANIE STOCHNYKH VOD GIDROLIZNYKH ZAVODOV DLYA OROSHENIYA POLEI),
V. T. Dodolina, V. I. Rakushina, L. M. Zakhartsova, V. G. Sinitsyn, and M. M. Malyutin.
Gidroliznaya i Lesokhimicheskaya Promyshlennost, No. 6, p 17-19, 1976. 3 tab.

Descriptors: *Irrigation water, *Effluents, Alfalfa, Corn(Field), Sudan grass, Wastes, Industrial wastes, Water pollution sources, Wastes water disposal, Disposal, Waste water treatment, Biological treatment, Sedimentation, Crop response, Irrigation effects, Waste dilution, Hydroponics, Water pollution control, Fermentation.
Identifiers: Fermentation industry.

Field experiments are described in which crops such as alfalfa, corn, and Sudan grass were irrigated with effluents from two fermentation plants. The effluents from one plant had been purified biologically, while effluents from the other plant had been subjected only to mechanical purification (sedimentation in ponds). The effluents, which contained up to 200 mg/liter nitrogen, 100 mg/liter potassium, and 75 mg/liter phosphorus, were used undiluted and diluted 1.5-fold to 2-fold. Irrigation at a rate of 2000-3000 kg/ha increased the yield of the crops 1.5-fold to 3-fold. Depending on the type of soil, the effluents may require preliminary treatments, such as neutralization, storage, or removal of some toxic substances. In most cases, however, simple dilution with river water is sufficient. The nutrients contained in this liquid fertilizer are easily absorbed. The fertilizers resemble hydroponic systems, and this explains their high effectiveness. (Stapinski-IPC)
W77-03814

ELECTROCHEMICAL PURIFICATION OF EFFLUENTS FROM THE MANUFACTURE OF SULFITE AND KRAFT PULPS (ELEKTROKHIMICHESKAYA OCHISTKA STOCHNYKH VOD OT PROIZVODSTVA SUL'FITNOI I SUL'FATNOI TSELLYULOZY),
A. D. Venderevskii, V. N. Syrovatko, and T. P. Pershina.
Bumazhnaya Promyshlennost, No. 8, p 25-26, August, 1976.

Descriptors: *Pulp wastes, *Sulfite liquors, *Electrochemistry, *Waste water treatment, Water pollution sources, Wastes, Industrial wastes, Waste treatment, Water pollution treatment, Chemical oxygen demand, Hydrogen ion concentration, Electrodes, Color, Water purification, Pulp and paper industry, Effluents, Energy.
Identifiers: Black liquors, Spent sulfite liquors, Spent pulping liquors.

Earlier studies at the All-Union Research Institute of the Pulp and Paper Industry (USSR) have indicated that bleaching effluents can be effectively purified by electrochemical treatment. Results are discussed obtained in a similar study on spent pulping liquors diluted to a concentration corresponding to that of pulp washing effluents. The starting materials were spent sulfite liquor (SSL) with a COD of 113,250 mg/liter and a pH of 2.5, and black liquor with a COD of 112,250 mg/liter and a pH of 11.5. Dilutions of up to 100 were used. Experiments were conducted with Mg, A1, and Fe electrodes. The effectiveness of the electrodes depended on the initial pH. In the case of black liquor, the Mg electrode gave the best results, while in the case of SSL the A1 electrode was the best. The degree of purification in terms of percentage COD and color reduction increased with dilution, but decreased in terms of absolute reduction and required a higher specific energy consumption. This can be explained by the lower salt concentration and conductivity of dilute solutions. Results obtained with a 50-fold dilution of SSL and a 100-fold dilution of black liquor (i.e., at concentrations corresponding to pulp washing effluents) indicated that the pulp washing effluents can be effectively purified by the electrochemical treatment. (Stapinski-IPC)
W77-03815

UTILIZATION OF THE SPENT SULFITE LIQUOR COMPONENTS IN THE PEKILO PROTEIN PROCESS AND THE INFLUENCE OF THE PROCESS UPON THE ENVIRONMENTAL PROBLEMS OF A SULFITE MILL,
K. Forss, and K. Passinen.
Paperi ja Puu, Vol. 58, No. 9, p 608-609, 611-612, 615-618, September, 1976. 11 fig, 4 ref, 10 tab.

Descriptors: *Sulfite liquors, *Proteins, *Byproducts, Wastes, Industrial wastes, Pulp wastes, Pulp and paper industry, Fermentation, Filtration, Carbohydrates, Biochemical oxygen demand, Effluents, Water pollution sources, Water pollution treatment, Water pollution control.
Identifiers: *Pekilo process, Sulfite mills.

The Pekilo process produces a microbiological mass containing about 60% proteins, plus some B-vitamins. The filamentous structure of the microfungus (Paecilomyces varioti or a similar species) facilitates quantitative separation of the product from the fermented spent sulfite liquor by filtration. A sulfite mill with an annual pulp production of 100,000 tons can produce 10,000-

15,000 tons/year of Pekilo protein by fermentation of spent sulfite liquor carbohydrates. The influence of fermentation on effluent BOD and composition of evaporator condensates is also discussed. (Brown-IPC)
W77-03816

POSSIBLE USES FOR FIBROUS SLUDGES FROM THE PULP AND PAPER INDUSTRY,
For primary bibliographic entry see Field 5E.
W77-03817

EXPERIENCES IN CLOSING THE WATER SYSTEM IN A PAPER AND BOARD MILL (ERFAHRUNGEN BEI DER KREISLAUFSCHLIESSUNG EINER PAPIER- UND KARTONFABRIK),
P. L. Model.
Das Papier, Vol. 30, No. 10, p 426-429, October, 1976. 1 fig, 1 illus. English summary.

Descriptors: Pulp and paper industry, *Water conservation, Water pollution sources, Foreign countries, Europe, Water pollution control, Sedimentation, *Water pollution treatment, Filtration, Corrosion, Effluents, Water management(Applied), *Pulp wastes, Water consumption(Except consumptive use).
Identifiers: *Switzerland, Closed systems, Paper mills, Board mills.

The conversion of the paper and board mill of Model AG. at Weinfelden, Switzerland, to a closed water system is described. The effluents from the paper and board mill, kept separate from domestic and yard wastes, are treated in a special sedimentation plant, followed by rotating and multilayer filtration. The closed system has resulted in the elimination of a proposed treatment plant for surface water, in a decrease of specific water consumption, and in the recovery of solids. Disadvantages are also discussed, especially corrosion problems. (Ward-IPC)
W77-03818

EFFECT OF RESIDUES FROM EFFLUENT TREATMENT DURING SOLID BOARD MANUFACTURE (AUSWIRKUNG VON RUECKSTANDEN AUS DER ABWASSERREINIGUNG BEI DER VOLLPAPPENERZEUGUNG),
Herzberger Papierfabrik Ludwig Osthushenrich K. G., Herzberg am Harz (West Germany).
G. Windaus, and E. P. Petermann.
Das Papier, Vol. 30, No. 10, p 432-435, October, 1976. 2 fig, 14 ref, 1 tab. English summary.

Descriptors: *Sludge disposal, *Recycling, *Pulp and paper industry, Foreign countries, Europe, Water pollution sources, Wastes, Industrial wastes, Water pollution control, Sludge, Solid wastes, Pulp wastes, Biological treatment.
Identifiers: *Germany, Board mills.

The experiences of two neighboring and equivalent paper mills and the problems encountered in recycling clarification residues from a biological treatment plant are compared. The Herzberg, Germany, plant of Herzberger Papierfabrik Ludwig Osthushenrich KG. put these residues back into production as early as 1963. Based on this company's experiences, similar recycling has been started by the Badische Kartonand Pappenfabrik in Obertsrot. No insurmountable difficulties have arisen, but there has been a 3-4% production loss at Obertsrot, although no such loss occurred at Herzberg. (Ward-IPC)
W77-03819

OPERATING EXPERIENCES WITH AN ELECTROLYTIC METHOD FOR PURIFYING NSSC (NEUTRAL SULFITE SEMICHEMICAL) EFFLUENT (BETRIEBSERFAHRUNGEN MIT EINEM ELEKTROLYTISCHEN VERFAHREN BEI DER REINIGUNG VON NSSC-ABWASSER),
Nettingsdorfer Papierfabrik A. G. (Austria).
J. Fischer.
Das Papier, Vol. 30, No. 10, p 429-432, October, 1976. 1 fig, 2 tab. English summary.

Descriptors: *Pulp wastes, *Waste water treatment, *Flocculation, Electrolytes, Wastes, Industrial wastes, Waste treatment, Water pollution treatment, Water pollution sources, Organic compounds, Costs, Operation and maintenance, Pulp and paper industry, Effluents, Water pollution control, Separation techniques, Electrolysis.
Identifiers: Semichemical pulp mills, Corrugating medium(Fluting paper).

In an integrated pulp and paper mill producing 130,000 metric tons of paper annually, a pulp plant producing 90 tons of neutral sulfite semichemical (NSSC) pulp/day is operated for the subsequent production of corrugating medium. Dissolved organic matter remaining in the pulp after the washers enters the paper machine effluent from the fourdrinier wire. An electrolytic flocculating plant was installed for partial extraction of organic substances from this effluent to reduce the total organic load of the combined effluents after final clarification. The plant designed is described, and the results, costs, and operating experience are reported. A brief review of the principles of electrolytic flocculation is included. (Ward-IPC)
W77-03820

EFFECT OF DYES USED IN THE TEXTILE INDUSTRY ON THE PURIFICATION OF EFFLUENTS BY THE ACTIVATED SLUDGE PROCESS (WPLYW NIEKTORYCH BARWNIKOW STOSOWANYCH W PRZEMYSLE WLOKIENNICZYM NA OCZYSZCZANIE SZIEKOW OSADEM CZYNNYM),
Technical Univ., Lodz (Poland).
M. Lebiedowski, and E. Zelazowska.
Przeglad Wlokienniczy, Vol. 30, No. 9, p 447-449, September, 1976. 4 fig, 7 ref, 2 tab.

Descriptors: *Waste water treatment, *Textiles, *Activated sludge, *Dyes, Wastes, Industrial wastes, Waste treatment, Water purification, Effluents, Toxicity, Biochemical oxygen demand, Water pollution treatment, Water pollution control, Water pollution sources, Microorganisms, Biological treatment, Sorption.

Activated sludge purification experiments were carried out on model effluents containing various dyes and dyeing additives in concentrations usually found in textile industry effluents. The dyes studied included direct dyes, sulfur dyes, vat dyes, disperse dyes, and acid dyes. All dyes had a toxic effect on the activated sludge microorganisms, as evidenced by the slow rate of 5-day BOD reduction. Acid and disperse dyes were the most toxic. Consequently, purification of effluents containing dyes by the activated sludge process should be preceded by sorption of the toxic components. (Stapinski-IPC)
W77-03821

MODERN TECHNIQUE FOR SEDIMENT REMOVAL (MODERN TEKNIK FOR SEDIMENTUPPTAGNING),
Industrikonstruktioner AB., Hassleholm (Sweden).
A. Sandberg.
Svensk Papperstidning, Vol. 79, No. 16, p 523-526, November 10, 1976. 8 fig. English summary.

Descriptors: *Settling basins, *Sludge disposal, Sludge, Treatment facilities, Nozzles, Pumps, Sewage sludge, Water pollution sources, Equipment, Pulp and paper industry, Pulp wastes.

A patented system for removing sediments from settling ponds is described, based on a suction nozzle connected to a submerged pump which traverses the pond suspended by a cable from a telfer. The movement of the nozzle is governed by the sediment profile. A preset path can also be maintained, and the removed slurry concentra can be held constant by adjusting the speed of suction nozzle. Since no scrapers are used, condition of the pond bottom is unimport (Brown-IPC)
W77-03822

WET OXIDATION OF CLARIFICAT SLUDGE AND PULP EFFLUENT BY THE Z PRO PROCESS (NASSOXYDATION KLAERSCHLAMM UND ZE STOFFABLAUGE MIT DEM ZIMPRO-V FAHREN),
U. Fenchel, and C. Ulrich.
Wochenblatt fuer Papierfabrikation, Vol. 104, 19, p 733-734, October 15, 1976. 1 fig.

Descriptors: *Pulp wastes, *Sludge disp Sludge treatment, *Oxidation, Wastes, Indu wastes, Municipal wastes, Water treatm Waste water treatment, Water pollution treatm Water pollution sources, Sludge, Effluents, and paper industry, Suspended solids.
Identifiers: Deinking sludge, Filler recovery, oxidation.

The Zimpro (Zimmermann Process) is a wet bustion process which can be used for various poses, including disposal of municipal slu combustion of pulp effluents, clarification s treatment, and filler recovery, all of which discussed. Its use for the treatment of waste p deinking sludge is mentioned, but not discu (Ward-IPC)
W77-03823

BIOLOGICAL EFFLUENT CLARIFICATIO THE PAPER MILL CIRCULATION SYS (BIOLOGISCHE ABWASSERAUFBEREIT IM KREISLAUF EINER PAPIERFABRIK),
B. Morgeli, and J. Gnieser.
Wochenblatt fuer Papierfabrikation, Vol. 104, 19, p 731-732, October 15, 1976. 3 fig, 1 illus, 1 tab.

Descriptors: *Activated sludge, *Pulp wa *Waste water treatment, Wastes, Indu wastes, Water pollution treatment, Suspe solids, Control, Biochemical oxygen demand, and paper industry, Effluents, Waste treatm Colloids, Water pollution control, Unsteady *Biological treatment, Aeration.
Identifiers: Board mills.

An activated-sludge process with two-stage tion is described for clarification of paper-mi fluents. Such a process is particularly vantageous for effluents with a relatively high tent of colloidal and suspended solids. Ex ments in a board mill show that it is possib compensate for variations in flow and poll load through an appropriate control sy Likewise, it is possible to preserve the activ sludge over 2-week periods of interrupted in ing effluent flow without observing a signif loss in BOD removal capacity. (Ward-IPC)
W77-03824

EUTROPHICATION AND FISH TOXI POTENTIALS IN A MULTIPLE-USE SUBTI ICAL RESERVOIR,
Hawaii Univ., Honolulu. Water Reso Research Center.
For primary bibliographic entry see Field 5C.
W77-03825

EQUALIZATION OF FLOW VARIATION COMBINED SEWERS,
Royal Inst. of Tech., Stockholm (Sweden). of Water Supply and Sewerage Engineering.
L-E. Janson, S. Bendixen, and A. Harlaut.
Journal of the Environmental Engineering sion, American Society of Civil Engineers, 102, No. EE6, Proceedings Paper 12596, p 1149, December 1976. 8 fig, 1 tab, 13 ref, 2 app

...N U. OF I. URBANA-CHAMPAIGN

riptors: *Combined sewers, *Environmental eering, Flow, Runoff, Storm runoff, Pipe Urban hydrology, Drainage, Water pollu- Hydrology, Storage.
ifiers: *Flow regulator, Storm water runoff, flow runoff, *Flow equalization.

thod was developed for equalizing the flow sing normally unutilized volumes in main rs and tunnels as temporary storage for ex- flow. This was achieved by installation of ning elements and flow regulators at certain s in the network. The basic flow is always arged through the flow regulator, computed tain a favorable use of the storage volume o maintain a satisfactory self-cleaning of the rs. At water levels up to the center of the r, only this basic flow is discharged, while ex- flow is stored upstream from the regulator. e the center of the sewer, a discharge starts four triangular outlets in the regulator. At ow, the discharge is practically the same as ipe capacity without a flow regulator. The ator has no moving parts and requires no ic power. (Lee-ISWS)
03860

ORPTION BIOOXIDATION TREATMENT VASTE WATERS TO REMOVE CONTAMI- TS THEREFORM,
rio Research Foundation, Sheridan Park. gnee).
sik.
Patent No. 3,980,556, 11 p, 4 fig, 6 tab, 8 ref; ial Gazette of the United States Patent Of- Vol 950, No 2, p 704, September 14, 1976.

riptors: *Patents, *Waste water treatment, age treatment, Water pollution treatment, r pollution control, Water quality control, ogical treatment, Activated sludge, egradation, Separation techniques, cling, Oxidation.
ifiers: Sludge regeneration, *Biooxidation.

ended and dissolved biodegradable car- ceous and nitrogenous materials present as minants in waste water, typically in raw stic or municipal sewage, are substantially ved by a one-stage treatment. The waste is contacted with a mixture of activated car- nd microorganisms, or activated sludge, hav- olecular oxygen absorbed in it. This results in ption and biooxidation of the carbonaceous rial, biooxidation of non-nitrate nitrogenous rial to nitrate and depletion of the molecular en whereupon biological reduction of the e to nitrogen gases occurs. The nitrogen are vented and the resulting treated water is ated from the activated sludge. Regeneration e activated sludge may be achieved by air ing, after which the regenerated activated e material may be recycled. Further, the d water may be subjected to clarification to lete the biological reactions and to remove ial suspended solids. The activated sludge the clarification may be regenerated by air ing followed by recycle of the regenerated ial to the reactor. (Sinha-OEIS)
03865

SPHORUS REMOVAL FROM WASTE- ER,
ersity Patents, Inc., Stamford, Conn. gnee).
l, N. A. Sinclair, F. A. Roinestad, and C. F.

Patent No. 3,980,557, 6 p, 3 ref; Official te of the United States Patent Office, Vol lo 2, p 705, September 14, 1976.

iptors: *Patents, *Waste water treatment, age treatment, *Phosphates, Water pollution ient, Water pollution control, Biological ient, Microorganisms, *Activated sludge, phorus.

Identifiers: Acinetobacter phosphadevorus(NRRL B-8058), *Orthophosphates.

This invention provides methods and materials useful in the removal of orthophosphate from wastewater, particularly sewage, through use of activated sludge wastewater treatment systems which have been 'enhanced' in their phosphate removal capacity by the introduction of a cultured growth of the microorganism Acinetobacter phosphadevorus (NRRL B-8058) into ghe sludge in a manner which establishes the organism as an active, sustained-growth biological component. Existing and newly-initiated activated sludge sewage treatment systems may be provided with an enhanced capacity for removal of orthophosphate without further chemial or physical manipulation of the sludge system. (Sinha-OEIS)
W77-03867

DEVICE FOR PURIFYING SEWAGE,
Hitachi Chemical Co., Ltd., Tokyo (Japan). (Assignee).
T. Miyagi, N. Katakai, M. Narita, T. Uchida, and M. Kimura.
U.S. Patent No. 3,980,561, 9 p, 10 fig, 5 tab, 9 ref; Official Gazette of the United States Patent Office, Vol 950, No 2, p 706, September 14, 1976.

Descriptors: *Patents, *Waste water treatment, *Sewage treatment, *Water purification, *Water pollution treatment, Biological treatment, Oxygenation, *Activated sludge, Aerobic conditions, Equipment.

A device for purifying sewage employs a bed of aerobes or activated sludge. The device is characterized by the use of a movable air supply which is moved across the bottom portion of the bed to apply a concentrated supply of air to a limited portion of the bed to effect air washing of the bed. The air washing is applied to the entire bed in a predetermined period of time. The device is comprised of a vessel having inlet and outlet ports and is adapted to receive sewage and form a bath of it. A micro-organism carrying bed structure occupies a part of the space in the vessel and leaves a free space which operates as a settling chamber. Air is supplied into the bath in a manner to dissolve oxygen in the sewage and generate a normal circulating flow of sewage which traverses the bed structure downwardly. The air supplied to the bed structure generates an agitating reverse flow of sewage-air mixture which traverses the bed structure in the upward direction. (Sinha-OEIS)
W77-03869

INHIBITION OF SCALE ON SALINE WATER HEAT EXCHANGE SURFACES WITH IMINODIACETIC ACID COMPOUNDS,
Grace (W. R.) and Co., Cambridge, Mass. (Assignee).
For primary bibliographic entry see Field 3A.
W77-03872

METHOD AND APPARATUS FOR ANAEROBIC FERMENTATION,
J. L. Coulthard.
U.S. Patent No. 3,981,803, 10 p, 6 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 950, No 3, p 1133, September 21, 1976.

Descriptors: *Patents, *Waste water treatment, *Sewage treatment, Water pollution treatment, Water pollution control, Water quality control, *Anaerobic treatment, *Fermentation, Algae, Methane bacteria, Carbon dioxide, Methane, Fertilizers, *Biological treatment.

The invention provides a method for the anaerobic fermentation of organic waste materials in a digestion zone. Algae produced externally of the zone are introduced into the digestion zone. This results in the neutralization of undesirable acidity in the digestion process, thereby preventing or at least minimizing inhibition of the acid sensitive form of methane bacteria and hence increasing gas production. At the same time, the rate of breakdown of fatty acids is increased, as is the nitrogen content of the effluent from the fermentation process. The latter effect may be utilized to advantage by using the effluent as the growth medium for the algae, which also benefits from the controlled acidity of the effluent. In addition, it has been found that by removing a substantial proportion of the carbon dioxide from the gas formed in the fermentation process and recycling it to the ferment, it is possible to increase still further the fermentation efficiency, leading to a gas product of higher methane content and hence higher heating value. Also, the bicarbonate content of the liquid effluent from the fermentation is increased which can also assist in algae photosynthesis. The method yields a combustible gas mixture consisting essentially of methane and provides useful harvests of algae and other by-product materials which may be used in the formation of nitrogenous fertilizers. (Sinha-OEIS)
W77-03873

NATIONAL ECONOMIC MODELS OF INDUSTRIAL WATER USE AND WASTE TREATMENT,
Houston Univ., Tex.
R. G. Thompson, J. A. Calloway, and A. K. Schwartz, Jr.
In: Economic Modeling for Water Policy Evaluation (Ed. by Robert M. Thrall et al.) North-Holland/TIMS Studies in the Management Sciences, Vol. 3, North-Holland/American Elsevier, New York, N.Y., 1976, p 57-74. 9 fig, 2 tab, 6 ref.

Descriptors: *Economic efficiency, *Water pollution control, *Industrial water, *Water utilization, *Evaluation, National, Standards, *Fuels, Effects, Water policy, Linear programming, Waste water treatment, Demand, Constraints, Waste treatment, Mathematical models, Systems analysis, Optimization.
Identifiers: *Industrial models, Nonlinear programming, Cost minimization, Waste discharge.

National policy is currently placing increasingly restrictive limitations on discharges of pollutants to the water. The present national goal is to eliminate the discharge of pollutants into navigable waters by 1985. National economic models of the five heavy water-using and fuel-using industries have been developed to show how cost-conscious managers of newly designed plants will respond to major modifications in waste discharge standards, resource availabilities, and resource prices. A new feature of these industrial economic models is that they synthesize the important technical data into a comprehensive economic basis for evaluating the effects of possible policy decisions on the use of resources, the discharge of wastes, and the costs of production before policy decisions are made. Considered are linear programming models which minimize costs. Discussed are structural economic models of important Standard Industrial Classifications developed from combinations of the plant models; these are then combined into a single integrated economic model of the major water-using industries. Plant model results show the effects of higher withdrawal costs and increasingly restrictive wastewater and solid waste discharge standards on resource use. Results of the integrated industry model show the effects of increased crude oil scarcity and increasingly restrictive effluent standards on resource, production, and waste discharges. (See also W77-03924) (Bell-Cornell)
W77-03928

PUBLIC CHOICE AND URBAN WATER QUALITY,
Georgia Univ., Athens.
For primary bibliographic entry see Field 6B.
W77-03960

PHYSICAL AND ECONOMIC PARAMETERS FOR PLANNING REGIONAL WASTEWATER TREATMENT SYSTEMS,
North Dakota State Univ., Fargo. Dept. of Civil Engineering.
S. L. Klemetson, and W. J. Grenney.
Journal of the Water Pollution Control Federation, Vol. 48, No. 12, p 2690-2699, December 1976. 6 fig, 7 tab, 27 ref.

Descriptors: *Waste water treatment, *Regional development, *Alternative planning, *Water pollution control, Mathematical models, Computer models, Evaluation, Operating costs, Standards, Interest rates, Economies of scale, Equations, Systems analysis.
Identifiers: *Model parameters, Unit costs, Cost equations, Indexes, Population.

The use of a mathematical computer model is often the only way to make a preliminary evaluation of a large number of feasible alternatives so that the number required for detailed analysis can be reduced. The development of the parameters necessary for the operation of such a mathematical model is described herein. The application of any model to a waste water treatment system requires that the chosen parameters be valid for real life problems. A number of such parameters is analyzed: population projections; wastewater quantity and quality; stream and effluent standards; pollution removal efficiencies; treatment level classifications; cost indices; interest rates; economies of scale; and cost coefficients for capital and for operation and maintenance costs. Treatment cost equations are developed and described. Through the use of the model, the costs for upgrading waste water treatment plant for a community can be estimated. The data should provide sufficient information for individuals wanting to develop models of waste water treatment systems. (Bell-Cornell)
W77-04010

OPTIMAL SEQUENCING IN INSTALLING WASTEWATER TREATMENT PLANTS,
Consiglio Nazionale delle Ricerche, Milan (Italy). Centro di Teoria dei Sistemi.
S. Rinaldi, R. Soncini-Sessa, and H. Stehfest.
Research Memorandum, RM - 75 - 77, International Institute for Applied Systems Analysis, Schloss Laxenburg, Austria, December 1975. 29 p, 4 fig, 3 tab, 12 ref.

Descriptors: *Waste water treatment, *Treatment facilities, *Linear programming, *Optimization, *Water quality control, River basins, Standards, Investment, Economics, Simulation analysis, Constraints, Algorithms, Equations, Mathematical models, Systems analysis.
Identifiers: *Sequencing, *Branch and bound algorithm, *Integer linear programming, Cost minimization, Oxygen deficit, Pollution index, Additivity property, Rhine River(W. Germany).

If a set of wastewater treatment plants is to be installed in a river basin within a given time period, the optimization problem is to select the best sequence in which the plants should be built. Two sequencing problems of this type are discussed herein, and branch and bound algorithms are proposed for solving them. The first problem is termed primary optimization, minimizing the total cost of the plants that give rise to a tolerable stream quality index. This myopic sequencing utilizes integer linear programming to solve what is referred to as the knapsack problem. Described are the main characteristics of a branch and bound search. The second problem is termed secondary optimization and consists in determining the sequence minimizing the sum of pollution indices over time. Integer linear programming and a branch and bound algorithm are employed here as well. The validity of some simplifying assumptions and the effectiveness of the methods from a computational viewpoint are shown by analyzing the case of the Rhine River in The Federal Republic of Germany. The branch and bound search method is very suitable for solving combinatorial problems by successively examining subsets of the set of solutions until one of the solutions located in one of the subsets is proved to be optimal. (Bell-Cornell)
W77-04019

ON THE COUNTERPLAN FOR TREATMENT OF FOUL WATER WHICH OOZED OUT FROM A DUMPING GROUND, (IN JAPANESE),
Okayama Univ. (Japan). Dept. of Public Hygiene.
T. Okamoto.
Okayama-Igakkai-Zasshi 88(1/2), p 1-7, 1976.

Descriptors: *Waste water treatment, *Leaching, Waste dumps, Garbage dumps, Waste disposal, Water pollution control.
Identifiers: *Japan(Makomo Valley).

The treatment of foul water leached from Makomodani (Makomo valley) of the dump Kurashiki City, Okayama Prefecture, Japan, is described. The most efficient plan is to restrict the garbage heap and provide for rain water drainage to prevent excess water in the dump.--Copyright 1976, Biological Abstracts, Inc.
W77-04066

STUDIES ON THE RECURRENCE OF BACTERIAL FLORA IN DRINKING WATER AFTER OZONIZATION, (IN GERMAN),
Essen Univ. (Gesamthochschule) West Germany). Inst. of Hygiene and Arbitsmed.
For primary bibliographic entry see Field 5F.
W77-04074

STUDY ON THE PURIFICATION OF SEWAGE WATER IN SOILS OF WESTERN SIBERIA, (IN RUSSIAN),
For primary bibliographic entry see Field 5G.
W77-04090

5E. Ultimate Disposal Of Wastes

BPT: CONSIDER THE ALTERNATIVES (BEST PRACTICAL TREATMENT CRITERION).
For primary bibliographic entry see Field 5D.
W77-03690

HYDRAULICS OF SURFACE BUOYANT JET,
Technical Univ. of Denmark, Copenhagen. Inst. of Hydrodynamics and Hydraulic Engineering.
For primary bibliographic entry see Field 8B.
W77-03743

PREPARATION OF FERTILIZERS FROM EFFLUENT SLUDGES OF FERMENTATION PLANTS (POLUCHENIE UDOBRENII IZ SHLAMOVYKH OTKHODOV GIDROLIZNOGO PROIZVODSTVA),
N. V. Glushchenko, M. A. Kuz'mina, V. A. Kuz'min, and R. G. Ivanova.
Gidroliznaya i Lesokhimicheskaya Promyshlennost, No. 6, p 5-6, 1976. 3 ref, 1 tab.

Descriptors: *Sludge, *Fertilizers, Water pollution, Wastes, Industrial wastes, Sludge treatment, Sludge disposal, Lignins, Humic acids, Organic compounds, Gypsum, Inorganic compounds, Neutralization, Aeration, Ammonia, Crop production, Crop response, Clovers, Potatoes, Phosphates, Nitrogen compounds, Phosphorus compounds, Potassium compounds, Ultimate disposal, Byproducts, Legumes, Calcium compounds, Sulfates.
Identifiers: *Fermentation plant, Peas, Ammonium sulfate.

During neutralization of hydrolyzates with lime, gypsum precipitates, and during subsequent clarification of the neutralizate, precipitatio finely dispersed lignin and colloidal humic stances occurs. This wastes, called gyp sludge, consists of 70% gypsum and 30% or substances. Another type of waste is a mixtu gypsum (about 70%) and insoluble superphosp (about 30%) obtained when superphosphate ammonium sulfate are added to the med resulting in the formation of diammo phosphate and gypsum. Finally, when the neu ized and nutrient salt-containing hydrolyza aerated, humic substances are oxidized precipitate. This waste consists of 97% or substances. All three types of waste also co nitrogen, potassium, and phosphorus compou as well as microelements. These waste mat can be converted into fertilizer by neutraliz with ammonia to pH 6-8, thickening, and dr Potatoes, clover, and peas treated with this f izer showed crop yield increases of 15-
(Stapinski-IPC)
W77-03810

USE OF EFFLUENTS FROM FERMENTAT PLANTS FOR FIELD IRRIGAT (ISPOL'ZOVANIE STOCHNYKH GIDROLIZNYKH ZAVODOV D OROSHENIYA POLEI),
For primary bibliographic entry see Field 5D.
W77-03814

POSSIBLE USES FOR FIBROUS SLUD FROM THE PULP AND PAPER INDUSTRY,
L. Soderhjelm.
Paperi ja Puu, Vol. 58, No. 9, p 620-622, 625 629, September, 1976. 6 fig, 11 ref, 7 tab.

Descriptors: *Sludge, *Pulp wastes, Pulp paper industry, Wastes, Industrial wastes, Fo countries, Europe, Costs, Disposal, S disposal, Ultimate disposal, Feeds, Silage, amendments, Construction materials, Ferm tion, Incineration, Fuels, Oxidation, Clays, pollution sources, Water pollution control, bohydrates, Byproducts.
Identifiers: *Finland, Xylitol Sugar alcohols.

In Finland, the generation of fibrous sludge treated pulp and paper mill effluents (white w amounts to about 180,000 oven-dry tons/ which would cost about $2,000,000 for disposal. A major proportion can be or cou recirculated and reused in paper, board, and insulation boards. However, some sludge are not suitable for recycling. Conversion animal fodder (silage supplement) and/or amendments seems to be an advantageous for low-ash sludges, whereas high-ash sludges find better use in the building industry, e bricks, cement tiles, and plastic fillers (to re wood flour). Additional possibilities include mentation (of birch- or other hardwood-de sludge fibers) into xylitol, other enzymic co sions, oxidation for clay recovery, and inci tion as fuel. (Brown-IPC)
W77-03817

EFFECT OF RESIDUES FROM EFFLU TREATMENT DURING SOLID BOARD M FACTURE (AUSWIRKUNG VON RUECKS DEN AUS DER ABWASSERREINIGUNG DER VOLLPAPPENERZEUGUNG),
Herzberger Papierfabrik Ludwig Osthushe K. G., Herzberg am Harz (West Germany).
For primary bibliographic entry see Field 5D.
W77-03819

MODERN TECHNIQUE FOR SEDIM REMOVAL (MODERN TEKNIK FOR S MENTUPPTAGNING),
Industrikonstruktioner AB., Hassle (Sweden).
For primary bibliographic entry see Field 5D.
W77-03822

...w. Ill. L. URBANA-CHAMPAIGN

OXIDATION OF CLARIFICATION
OGE AND PULP EFFLUENT BY THE ZIM-
PROCESS (NASSOXYDATION VON
ERSCHLAMM UND ZELL-
FFABLAUGE MIT DEM ZIMPRO-VER-
REN),
rimary bibliographic entry see Field 5D.
-03823

ROPHICATION AND FISH TOXICITY
ENTIALS IN A MULTIPLE-USE SUBTROP-
L RESERVOIR,
aii Univ., Honolulu. Water Resources
arch Center.
rimary bibliographic entry see Field 5C.
-03825

ING OF SUBMERGED TWO-DIMEN-
IAL BUOYANT JETS IN UNIFORM
IES OF WATER IN THE ABSENCE AND
SENCE OF WIND ACTION,
ornia Univ., Berkeley. Div. of Hydraulic and
ary Engineering.
rimary bibliographic entry see Field 8B.
-03828

THOD OF DISPOSING SLUDGES CONTAIN-
SOLUBLE TOXIC MATERIALS,
ning-Ferris Industries, Inc., Houston, Tex.
ignee).
Thompson.
Patent No. 3,980,558, 4 p, 3 ref; Official
tte of the United States Patent Office, Vol
No 2, p 705, September 14, 1976.

riptors: *Patents, *Waste disposal, *Ultimate
sal, Water pollution sources, Waste storage,
te treatment, Industrial wastes, Toxicity, Tox-
Water pollution, Cements, *Sludge disposal.

invention is a process for permanently dispos-
f liquid or semi-liquid wastes containing solu-
oxic materials to prevent leaching of these
materials into the surrounding environment.
comprised of admixing the liquid or semi-
d wastes and a solidifying agent consisting es-
ally of a hydraulic cement in an amount suffi-
to provide a fluid mass which will set upon
ding to a contiguous rock-like solid consisten-
The contiguous rock-like solid is insoluble in
r and the soluble toxic materials are en-
ed and prevented from leaching into the sur-
ding environment. It has been found that the
d or semi-liquid wastes must be admixed with
hydraulic cement in an amount of at least
t 9 lbs cement per gallon of waste containing
about 30 to 40% solids to provide a mixture
h will be sufficiently fluid yet will set to a
-like solid consistency of sufficient strength
non-porosity to entrap the soluble toxic
rials to prevent leaching. The process in-
es pouring the mixture of semi-liquid waste
binding agent into a subsurface soil pit lined
a moisture impervious film prior to setting
then covering the solidified mass with a layer
il. (Sinha-OEIS)
-03866

ROLOGY OF THE SOLID WASTE BURIAL
OUND, AS RELATED TO THE POTENTIAL
RATION OF RADIONUCLIDES, IDAHO
TIONAL ENGINEERING LABORATORY,
logical Survey, Boise, Idaho. Water
ources Div.
primary bibliographic entry see Field 5B.
-03874

ASTAL MARINE POLLUTION AND FISH,
eries and Marine Service, West Vancouver
ish Columbia). Pacific Environment Inst.
primary bibliographic entry see Field 5C.
-03902

CONSTRUCTION IN THE COASTAL ZONE: A POTENTIAL USE OF WASTE MATERIALS,
Coastal Engineering Research Center, Fort Belvoir, Va.
For primary bibliographic entry see Field 6G.
W77-03916

AN ENVIRONMENTAL SURVEY OF EFFECTS OF DREDGING AND SPOIL DISPOSAL, NEW LONDON, CONNECTICUT. 1ST QUARTERLY REPORT.
National Marine Fisheries Service, Highlands, N.J. Middle Atlantic Coastal Fisheries Center.
For primary bibliographic entry see Field 5C.
W77-03917

AN ENVIRONMENTAL SURVEY OF EFFECTS OF DREDGING AND SPOIL DISPOSAL, NEW LONDON, CONNECTICUT. 2ND QUARTERLY REPORT.
National Marine Fisheries Service, Highlands, N.J. Middle Atlantic Coastal Fisheries Center.
For primary bibliographic entry see Field 5C.
W77-03918

AN ENVIRONMENTAL SURVEY OF EFFECTS OF DREDGING AND SPOIL DISPOSAL, NEW LONDON, CONNECTICUT. 3RD QUARTERLY REPORT.
National Marine Fisheries Service, Highlands, N.J. Middle Atlantic Coastal Fisheries Center.
For primary bibliographic entry see Field 5C.
W77-03919

THE APPLICATION OF BOREHOLE GEOPHYSICS TO THE SELECTION AND MONITORING OF NUCLEAR WASTE DISPOSAL SITES,
Geological Survey, Lakewood, Colo. Water Resources Div.
D. E. Eggers.
Reprint from Proceedings of 17th U.S. Symposium on Rock Mechanics, held at Snowbird, Utah, August 25-27, 1976: U.S. National Committee for Rock Mechanics of the National Academy of Sciences, National Research Council, p 4B-1 - 4B-3-7, 1976. 5 fig, 1 tab, 13 ref.

Descriptors: *Waste disposal wells, *Nuclear wastes, *Borehole geophysics, *Borehole cameras, *Aquifer characteristics, Water pollution control, Groundwater, Path of pollutants, Injection wells.
Identifiers: *Waste disposal site selection.

The borehole televiewer is used for identifying fracture porosity that can have crucial bearing on the patterns of ground-water flow and, consequently, the migration of radionuclides associated with radioactive wastes. Borehole gamma spectrometry is used to identify and determine the concentration levels of artificial gamma-emitting radionuclides moving in the ground-water system. The artificial radioisotopes Co-60, Cs-134, and Cs-137 have been detected in a monitoring research program conducted at some of the existing commercially and federally operated solid low-level radioactive waste-burial sites. Concentration levels as great as several tons of picocuries per gram have been measured. The detection limits of the borehole gamma-spectrometry system now in use are of the order of 0.1 picocuries per gram. (Woodard-USGS)
W77-03970

GROUND-WATER POLLUTION NEAR A LANDFILL,
Rhode Island Univ., Kingston. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5B.
W77-03991

5F. Water Treatment and Quality Alteration

THE USE OF MACRORETICULAR POLYMERIC ADSORBENTS FOR THE TREATMENT OF WASTE EFFLUENTS,
Rohm and Haas Co., Philadelphia, Pa.
For primary bibliographic entry see Field 5D.
W77-03605

HYGIENIC ASSESSMENT OF THE DESTRUCTION PRODUCTS OF SURFACTANTS IN WATER OZONIZATION, (IN RUSSIAN),
Moskovskii Gosudarstvennyi Meditsinskii Institut (I) (USSR). Dept. of Public Hygiene.
For primary bibliographic entry see Field 5D.
W77-03772

IDENTIFICATION OF 1,1,1-TRICHLOROACETONE (1,1,1-TRICHLOROPROPANONE) IN TWO DRINKING WATERS: A KNOWN PRECURSOR IN HALOFORM REACTION,
Drexel Univ., Philadelphia, Pa. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W77-03794

INTERNAL TREATMENTS FOR BOILERS OPERATING ABOVE 1200 PSI,
Nalco Chemical Co., Oak Brook, Ill.
For primary bibliographic entry see Field 8G.
W77-03803

REDUCTION OF DEPOSIT FORMATION IN HEAT EXCHANGERS (SNIZHENIE OSADKOOBRAZOVANIYA V TEPLOOBMENNOI APPARATURE),
For primary bibliographic entry see Field 8G.
W77-03808

TESTS OF COAST GUARD DEVELOPED HIGH SEAS OIL RECOVERY SYSTEMS AT EPA OHMSETT,
Coast Guard, Washington, D.C.
For primary bibliographic entry see Field 5G.
W77-03905

STUDIES ON THE RECURRENCE OF BACTERIAL FLORA IN DRINKING WATER AFTER OZONIZATION, (IN GERMAN),
Essen Univ. (Gesamthochschule) West Germany). Inst. of Hygiene and Arbitsmed.
K. Stalder, and W. Klosterkoetter.
Zentralbl Bakteriol Parasitenkd Infektionskr Hyg Erste Abt Orig Reihe B Hyg Praev Med 161(5/6), p 474-481, 1976.

Descriptors: *Bacteria, *Potable water, Aquatic plants, Nutrients, Disinfection, *Ozone, Organic matter, Water treatment, Waste water treatment.
Identifiers: *Ozonization.

The use of O3 as a drinking water disinfectant is increasing. As opposed to the commonly used Cl the disinfecting activity of O3 cannot be sustained in the water during the distribution process, and as a result recontamination and bacterial growth are not adequately under control. Information about the safety margins of this disinfecting procedure was obtained in experiments simulating the working conditions of a water plant including supply system. After treatment with 1.5 mg O3/1 water, specimens with no detectable residual O3 remained sterile for at least 1 mo. During the passage of a pipeline of 1200 m length recontamination with and considerable growth of microorganisms was observed. After inoculating water sterilized by O3 with a normal population of water bacteria, the bacterial growth was more

pronounced than in similar experiments with heat-sterilized water of the same origin. This may be an indication that the breakdown products of organic water contaminants (e.g., humic acid) resulting from the O3 treatment are better nutrients for the water bacteria than the original organic substances themselves.--Biological Abstracts, Inc.
W77-04074

WATER DISINFECTION BY MEANS OF CHLORINE: KILLING OF AGGREGATE BACTERIA, (IN GERMAN),
Erlangen-Nuremberg Univ. (West Germany). Hygiene Inst.
S. Carlson, U. Haesselbarth, and R. Langer.
Zentralbl Bakteriol Parasitenkd Infektionskr Hyg Erste Abt Orig Reihe B Hyg Praev Med 161(3), p 233-247, 1975.

Descriptors: *Chlorine, *Bacteria, *Disinfection, Algae, E. coli, Salmonella, *Water treatment.
Identifiers: *Aggregate bacteria, Flocculants, *Salmonella-Anatum.

Rising water demands ask for an increasing utilization of more or less contaminated surface water that has to be chlorinated prior to treatment. Especially during periods of lake bloom, the desired disinfecting effect is not achieved in spite of high concentrations of Cl present. This is due to a coating of bacterial surfaces by substances such as algal products having a protective effect as demonstrated in experimental studies. Bacteria in a central position within bacterial aggregates as formed by the addition of flocculants in the process of water treatment, are also protected against the action of Cl. In cases of inadequate filter backwashing, such aggregates may penetrate into clean water. Accumulations of bacteria in the shape of widespread growth may also form on activated C filters, ion exchangers, at walls of tanks under unfavorable hydraulic conditions and in stagnant parts of supply pipes. Curves depicting the kill of Escherichia coli differentiated by O-agglutination and Salmonella anatum were exhibiting longer survival periods as compared with non-aggregate bacteria. For organisms differentiated by H-agglutination, kill was between these values. The killing rate was a function of the oxidation-reduction potential. Survival times of E. coli and S. anatum were different. Cl concentrations common in the practice of water works frequently do not suffice to kill bacteria within aggregates and a colony count does not permit conclusions as to the bacterial count if bacterial aggregates are present.--Biological Abstracts, Inc.
W77-04075

BDELOVIBRIO BACTERIOVORUS AS A FACTOR OF THE SELF-PURIFICATION OF RIVER WATER, (IN RUSSIAN),
Akademiya Nauk SSSR, Pushchino. Inst. of Biochemistry and Physiology of Microorganisms.
For primary bibliographic entry see Field 5G.
W77-04095

5G. Water Quality Control

IN-PLANT, OUTSIDE POLLUTION EVILS, ENERGY SAVING TOP AATCC CONCERNS.
Textile World, Vol. 126, No. 11, p 108, 111, 113, 115, 116, 118, 121, November, 1976.

Descriptors: *Textiles, *Industrial wastes, *Water pollution control, *Biochemical oxygen demand, *Dyes, Waste water treatment, Recycling, Biological treatment, Lime, Ozone, Color, Recycling, Activated carbon, Energy.

Several aspects of pollution and energy savings concerns in the textile industry were discussed. The problem of substances used in the permanent press processing of cotton which could produce carcinogens was investigated. A major concern was the correction of water pollution caused by effluent from textile works. Tests were conducted on dye bath, scour and rinse waters from the dyeing process. In several cases, high BOD, TOC, or ammonia nitrogen were explained by known additions to the dye bath. BOD was highly reduced by biological treatment, but TOC reduction was not as great, suggesting the presence of materials which were not readily biodegradable. Biological treatment was not successful at color removal, but a treatment which combines alum and powdered activated carbon was quite effective. Lime was an effective treatment for waste water containing calcium carbonate-forming levels of carbonate alkalinity. Reactive and basic dye colored water was successfully treated with ozone, but it could not adequately decolorize waste water colored by disperse dyes. 1,2,4-Trichlorobenzene, a dye carrier, is biodegradable and 65% or more of it can be removed in a well-aerated basin. For small plants a fixed bed adsorber system with no on-site regeneration system was suggested. Larger plants were urged to incorporate a pulsed bed system with an on-site regeneration system for recycling spent carbon. Combined activated carbon and biological treatment systems are being tested. Solar energy and energy recycling were two suggestions for providing energy savings. (Collins-FIRL)
W77-03620

LOSSES OF DIURON, LINURON, FENAC, AND TRIFLURALIN IN SURFACE DRAINAGE WATER,
Agricultural Research Service, Baton Rouge, La.
G. H. Willis, R. L. Rogers, and E. M. Southwick.
Journal of Environmental Quality, Vol 4, No 3, 1975. p 399-402, 5 tab, 27 ref.

Descriptors: *Return flow, Runoff, *Herbicides, Water pollution, Water quality, Pollution, Aquatic environment, Aquatic life, *Drainage water, Mississippi River basin.
Identifiers: *Diuron, *Linuron, *Fenac, *Trifluralin, *Mississippi River Valley.

Diuron, linuron, fenac, and trifluralin were applied to plots designed for sampling surface runoff. Over a 3-year period, highest concentrations in runoff were usually associated with rainstorms that occurred soon after application. Maximum seasonal losses were less than 0.12, 0.30, 2.90, and 0.05% of the applied diuron, linuron, fenac, and trifluralin, respectively. The data suggest that with proper use on agricultural land in the lower Mississippi River Valley these herbicides pose little threat to adjacent aquatic areas. (Skogerboe-Colo St)
W77-03639

WATER POLLUTION CONTROL ADMINISTRATION, A MEMORANDUM REPORT ON A RECONNAISSANCE STUDY.
Public Administrative Service, Chicago, Ill.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-245 752, Price codes: A02 in paper copy, A01 in microfiche. Prepared for HEW, Public Health Service, April 1963, 18 p.

Descriptors: *Water pollution control, *Water quality control, *Administration, *Water pollution, *Management, Governments, Decision making, Coordination, Planning, Water management(Applied), Water policy, Water resources development, Water conservation, Federal jurisdiction, Federal government, State jurisdiction, State governments, Local governments.

According to a reconnaissance survey conducted by the Public Administration Service, the present approach in water pollution control administration is inadequate because of insufficient money and effort and because of poor administration. The numerous governmental agencies involved in water pollution control administration further complicate efficient organization and operatio
Although ultimate authority lies with state gover
ments over water within their boundaries, feder
standards and financing can not be ignored. T
report examines state administration, state-lo
relations, state-federal relations, and industrial
volvement. The report recommends more efficie
state administration with clear-cut programs a
objectives that can be coordinated with the r
tional effort in order to arrive at a coordinated a
efficient level of administration. The report al
emphasizes the need for an effective enforceme
program to help implement the water polluti
control plans. (Welch-Florida)
W77-03684

CALIFORNIA WATER LAW IN PERSPECTIV
California State Water Resources Control Boa
Sacramento.
For primary bibliographic entry see Field 6E.
W77-03689

**LEGAL PROTECTION FOR FLORIDA WE
LANDS,**
Florida Univ., Gainesville. School of Law.
For primary bibliographic entry see Field 6E.
W77-03696

**ENVIRONMENTAL PROTECTION IN MEXI
AND CANADA,**
Florida Univ., Gainesville. School of Law.
For primary bibliographic entry see Field 6E.
W77-03698

**CONTINGENCY PLAN FOR SPILLS OF O
AND HAZARDOUS MATERIALS FOR INLA
WATERS OF REGION III.**
Environmental Protection Agency, Philadelph
Pa. Region III.
Available from the National Technical Inform
tion Service, Springfield, VA 22161 as PB-244 9
Price codes: A11 in paper copy, A01 in microfic
Report EPA 903/9-73-007, December 1973. 247
17 map.

Descriptors: *Oil spills, *Water pollution tre
ment, *Federal government, *Inter-agen
cooperation, Coordination, Delaware, Virgin
West Virginia, Maryland, Pennsylvania, Planni
Disasters, Water pollution sources, Water pol
tion, Oil pollution, Cleaning.
Identifiers: *Oil Pollution Act, *Administrati
regulations.

A coordinated response from all concerned fede
agencies to minimize hazards from the dischar
of oil or other substances is outlined in this plan
provides for assignment of duties, establishme
of task forces, structure of reporting systen
establishment of operations centers, schedules
chemical treatments, enforcement procedur
press guidelines, and on-scene coordinati
Beginning with the assumption that federal ag
cies should start to take all actions and respon
bilities delegated to each agency, the rep
proceeds to develop national and regional acti
ties, both permanent and contingency orient
The plan annexes contain a detailed guide to act
performance for the states of Pennsylvania, Ma
land, Virginia, West Virginia, and Delaware.
formation and phone numbers are provided
military commands, agencies, cleanup contra
tors, sources of hay, pumps, waste-oil dealers, a
craft, spray planes, floodlights, vacuum truck
weather forecasters, local aid groups, barge
skimmers, and boats. Data is also provided
chemical and physical properties of spills, fundi
for clean-ups, coordination with state agencie
legal guidelines, and how to handle publici
(Molloy-Florida)
W77-03700

...ARY U. OF I. URBANA-CHAMPAIGN

NGPAN--ARKANSAS PROJECT ORADO, FINAL ENVIRONMENTAL TEMENT,
au of Reclamation, Washington, D. C
rimary bibliographic entry see Field 8A.
03702

TE ADMINISTRATION GENERALLY VERS AND DUTIES OF THE DEPART-T OF WATER RESOURCES).
rimary bibliographic entry see Field 6E.
03704

MATH RIVER BASIN COMPACT.
rimary bibliographic entry see Field 6E.
03705

AGES COMPENSABLE UNDER FEDERAL ITIME LAW FOR INJURIES CAUSED BY HARGE OF OIL INTO NAVIGABLE ERS,
Rydstrom.
LR Fed 346-58 (1976). 13 p.

riptors: *Navigable waters, alties(Legal), *Oil spills, *Damages, Fishing, fishing, Commercial fishing, Fish, Aquatic Water pollution sources, Oil pollution, Oil es, Water pollution, Oil industry, Oily water, ral government, State governments, Governal interrelations, Legal aspects, Social cts, Judicial decisions, Water law, Water ty, Legislation, Beaches, Ships.
ifiers: *Water Quality Improvement Act of *Water Pollution Control Act of 1972, ance(Legal aspects), Proximate causation, gation obstructions.

Federal Water Pollution Control Act of 1972 not take cognizance of illegal oil discharge ge claims except to the extent of the costs of ederal Government if it does the cleaning up. states are left free to impose liability in ges for losses suffered by both the states selves and private interests. The courts in ral cases have recognized compensable rights llution-free navigable waters. States have allowed to recover damages for the cost of up and also as parens patriae for damage to aquatic life. Private parties also may er damages for destruction of marine life due l spills where they can show an injury dift in kind from the public in general. Usually, nercial fishermen will be granted relief while weekend fisherman will not. Injury to both c and private vessels caused by the discharge il into navigable waters is compensable. rietors of beach houses and operators of h activities on navigable waters have been al-d recovery for damages provided they meet different in kind' test. The loss of the use of a te pleasure boat is not compensable when a arge of oil merely deprives its owner tem-rily. (Moorhouse-Florida)
03711

ER V DEPT OF HEALTH (LOCATION OF CH FIELD RELATIVE TO WATER PLY).
rimary bibliographic entry see Field 6E.
03713

AR LAKE APARTMENTS, INC V CLEAR E UTILITIES (EXCLUSIVE RIGHT TO VIDE WATER NOT A COVENANT NING WITH THE LAND).
rimary bibliographic entry see Field 6E.
03716

TECTION OF WATER SUPPLY.
rimary bibliographic entry see Field 6E.
03719

MARINE SANITATION.
For primary bibliographic entry see Field 6E.
W77-03720

DELETERIOUS SUBSTANCES IN STREAMS.
For primary bibliographic entry see Field 6E.
W77-03721

WATER AND SEWAGE.
For primary bibliographic entry see Field 6E.
W77-03724

THE POTENTIAL FOR NUCLEAR AND GEOTHERMAL POWER PLANT SITING IN IDAHO AS RELATED TO WATER RESOURCES,
Idaho University, Moscow, Dept of Civil Engineering.
For primary bibliographic entry see Field 3E.
W77-03730

CURRENTS AND POLLUTANT DISPERSION IN LAKE MICHIGAN, MODELED WITH EMPHASIS ON THE CALUMET REGION,
Illinois Univ. at Chicago Circle. Dept. of Information Engineering.
For primary bibliographic entry see Field 5B.
W77-03732

DEVELOPMENT DOCUMENT FOR EFFLUENT LIMITATIONS GUIDELINES AND NEW SOURCE PERFORMANCE STANDARDS FOR THE COPPER, NICKEL, CHROMIUM, AND ZINC SEGMENT OF THE ELECTROPLATING POINT SOURCE CATEGORY,
Environmental Protection Agency, Washington, D. C. Effluent Guidelines Div.
K. R. Krickenberger.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-238 834, Price codes: E03 in paper copy, A01 in microfiche. Report No. EPA-440/1-74-003-a, March 1974. 68-01-0592.

Descriptors: *Industrial wastes, *Chemical wastes, *Metal, *Water pollution sources, *Water quality standards, Industrial plants, Industries, Electrochemistry, Acids, Toxins, Copper, Nickel, Chromium, Zinc, Industrial production, Waste water(Pollution), Effluents, Standards.
Identifiers: *Electroplating industry, *Point source pollution, Rack and barrel electroplating, Cyanide, Effluent limitations guidelines.

Industrial activities relating to rack and barrel electroplating of copper, nickel, chromium and zinc constitue a single subcategory of point source pollution for effluent limitations guidelines purposes. Considerations of such factors as plant age, production process, geographic location, wastes generated, wastewater treatment, and control techniques, all support this conclusion. This segment contributes about two-thirds of the chemicals added to wastewater in the electroplating industry. Sufficient data was available for 53 operating plants, showing that 13 of them achieve concentrations of pollutants and water use estimates upon which the guidelines are based in the treated effluent using conventional chemical treatment system. Of these 13 plants, 11 are captive and two are job-shops. Verification testing on four plants shows that two of them--one a captive and the other a job shop--are meeting the guidelines. Guidelines are delineated for degree of effluent reduction attainable through application of the 'Best Practicable Control Technology Currently Available' and the 'Best Available Technology Economically Feasible' and new source performance standards are given for the degree of effluent reduction achievable through use of the best available demonstrated control technology, processes, operating methods or other alternatives. (Harris-Wisconsin).
W77-03775

WATER POLLUTION INVESTIGATION: DETROIT AND ST. CLAIR RIVERS.
Environmental Control Technology Corp., Ann Arbor, Mich.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-242 604, Price codes: A16 in paper copy, A01 in microfiche. Report No. EPA-905/9-74-013, December 1974. 364 p. 88 fig., 31 tab., 67 ref., 4 append. EPA 68-01-1570.

Descriptors: *Rivers, *Pollution abatement, *Lake Erie, *Surveys, *Water quality, Water pollution control, Water quality standards, Mathematical models, Biological communities, Chemical properties, Benthos, Phytoplankton, Pollutants, Pesticides, Heavy metals, Eutrophication, Monitoring, Sewage effluents, Chlorides, Phenol, Cliforms, Nutrients, Trace elements, Bottom sediments, Projections, *Michigan, Iron, Varieties, Chlorophyll, Ammonia, Phosphorus, Great Lakes.
Identifiers: *St. Clair River(Mich), *Detroit River(Mich), Effluent limitations, Lake St. Clair.

The St. Clair and Detroit Rivers near Detroit, Michigan, were surveyed to evaluate effects of effluent limitations on the water quality of the rivers, of Lake Erie and the Great Lakes. Survey results were compared to historical records with indications that pollution abatement programs instituted during the last decade have enhanced water quality in the region. Parameters measured included: chloride, coliforms, biochemical oxygen demand, and chemical oxygen demand; cadmium, chromium, copper, lead, mercury, nickel, zinc, manganese, iron and their sediment exchange; and nitrogen compounds and phosphorus. Biological sampling, including benthos, was related to species diversity, dominant organisms, and chlorophylla. A steady state mathematical model was developed for the Detroit River, incorporating a three-dimensional system; it is capable of simulating first order reaction kinetics and a coupled system, such as BOD-DO. Its function is to allow a definition of waste inputs as well as projections of water quality based on higher degrees of wastewater treatment and alternative management plans. Current water quality standards and/or goals are presently met, with occasional exceptions of phenol and mercury in the St. Clair River, and with respect to total coliforms, phenol and mercury in the Detroit River. The model projects that present effluent limitations will meet the goal of 2 microgram/l average phenol concentration in 1977. (Auen-Wisconsin)
W77-03783

ELEMENTS OF QUALITY ASSURANCE IN ENVIRONMENTAL SURVEILLANCE,
Los Alamos Scientific Lab., N. Mex. Environmental Studies Group.
For primary bibliographic entry see Field 7A.
W77-03786

A SCHEME FOR EFFECTIVE CONTROL OF EFFLUENT PH,
Celanese Chemical Co., Bishop, Tex.
For primary bibliographic entry see Field 5D.
W77-03802

WATER TREATMENT FOR BOILER OPERATING PRESSURES ABOVE 1200 PSIG,
Ecodyne Corp., Union, N. J. Graver Water Div.
For primary bibliographic entry see Field 3E.
W77-03805

A SURVEY OF PULP AND PAPER INDUSTRY ENVIRONMENTAL PROTECTION EXPENDITURES AND OPERATING COSTS - 1975,
National Council of the Paper Industry for Air and Stream Improvement, Inc., New York.
For primary bibliographic entry see Field 5D.
W77-03807

GREAT LAKES (PAPER CO.) PIONEERS TOMORROW'S TECHNOLOGY,
For primary bibliographic entry see Field 5D.
W77-03809

WATER PROBLEMS IN THE COLORADO RIVER BASIN: LEGAL AND INSTITUTIONAL FRAMEWORK,
Economic Research Service, Washington, D.C.
J. Chrisman, Jr., J. H. Snyder, and C. V. Moore.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 033, Price codes: A05 in paper copy, A01 in microfiche. Working paper, Number 2, NRE Economic Research Service, U.S. Dept. of Agriculture, April 1976. 70 p, 3 fig, 15 tab. (California Water Resources Center Project UCAL-WRC-W-244).

Descriptors: *Water quality, *Management, *Interstate, Federal-state water rights conflicts, Legal aspects, Ordinances, *Colorado River basin, California, Arizona, Legal aspects, *Institutions, Water rights, International waters.
Identifiers: Colorado River(Calif-Ariz).

A comprehensive review is presented of state, interstate, and international arrangements, agreements, contracts and legal decisions that have governed or now dictate management of the waters in the Colorado River. Emphasis is placed on legal and institutional arrangements as they relate to water quality management problems. Implications of recent decisions governing construction of a desalting plant are included. (California, Davis)
W77-03830

STANDARD 'POTABLE WATER' (ALL-UNION STATE STANDARD 2874-73, A NEW STAGE IN THE DEVELOPMENT OF WATER HYGIENE, (IN RUSSIAN),
Nauchno-Issledovatelskii Institut Gigieny, Moscow (USSR).
Y. V. Novikov.
Vestn Akad Med Nauk SSR 3, p 59-64, 1975.

Descriptors: *Potable water, *Water quality standards, E. coli, Fluorine, *Public health, Toxicity, Sulfates, Phosphates, Radioisotopes, Ions, Sodium, Strontium radioisotopes.
Identifiers: Radon-226, Selenium, Silver, Strontium-90, Uranium, *USSR.

During development of a potable water standard, the concept of summation of similar effects produced by minor concentrations of substances contained in water was formulated. In accordance with the new standard a calculating formula which takes into account the combined effect of various substances according to their toxicological characteristics is given. (Escherichia coli, polyacrylamide, Se, F, U, 226Ra, 90Sr, Ag ions, sulfates and Na hexametaphosphate are mentioned.)
W77-03853

METHOD AND AN APPARATUS FOR COLLECTING SUBSTANCES AND OBJECTS ON A LIQUID SURFACE,
E. S. Netzell.
U. S. Patent No. 3,980,559, 12 p, 6 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 950, No 2, p 705, September 14, 1976.

Descriptors: *Patents, *Oil spills, *Oily water, *Oil pollution, Water pollution treatment, *Water pollution control, Water quality control, *Separation techniques, Equipment pontoons, *Pollution abatement.
Identifiers: Conveyor belts.

The apparatus for collecting oil on a water surface is comprised of two parallel pontoons positioned beside each other. A basin is formed between these pontoons by the opposite pontoon side walls and a bottom plate. When the craft arrives at an area where the water surface is polluted, the plates in front of the basin are adjusted in such a way that the front edge of the leading plate is positioned at an appropriate distance under the water surface. This distance is choosen from case to case depending on the substances and objects floating on the surface. Then, the slope of the plates is adjusted in such a way that, when the craft moves through the water, the upper layer of the water and the substances and objects floating in this layer flow up on the plates and over the upper edge of the plates and further out on the distributing surface, where the polluted water is distributed and spread out. From the distributing surface the water and the carried substances flow either through holes in the distributing surface or over the edges onto the collecting area which constitutes a large portion of a conveyor belt. The substances are collected by the conveyor belt or by a protecting layer resting on the conveyor belt and transported to the collecting receptacle. The water which flows through the conveyor belt is drained off through the pumps arranged at the rear wall of the basin. (Sinha-OEIS)
W77-03868

COMPOSITION FOR REMOVAL OF IMMISCIBLE FLUIDS FROM WATER SURFACES AND LAKE BEDS,
Electrolysis Pollution Control Inc., Minneapolis, Minn. (Assignee).
E. C. Peterson.
U.S. Patent No. 3,980,566, 4 p, 8 ref; Official Gazette of the United States Patent Office, Vol 950, No 2, p 707, September 14, 1976.

Descriptors: *Patents, *Oil spills, *Oil pollution, Water pollution treatment, *Water pollution control, Water quality control, *Separation techniques, Adsorption, *Pollution abatement.
Identifiers: Lead slag mineral wool, Natural stone.

A method of removing immiscible fluids such as oil spills from the surface of bodies of water comprises placing an adsorbant compound on the water surface in contact with the immiscible fluid and maintaining contact between the surface of the immiscible fluid and the adsorbant material until the immiscible fluid is adsorbed. The adsorbant compound consists of an admixture comprising from between about 30% and 70% by weight of lead slag mineral wool, with the balance being a finely divided natural stone substance containing substantial quanties of iron, aluminum, and magnesium oxides, including such natural stones as trap rock, basalt and gabbro. The lead slag mineral wool is treated with a hydrophobic-oil-soluble hydrocarbon chain substance, such as oleic acid to wet the surface of the mineral wool prior to mixing with stone flour. The lead slag mineral wool is preferably fragmented into nodules having a diameter of 1/2 to 1 inch. The composition may be also utilized for removing oil spills from lake beds or soil surfaces. The composition of the adsorbant compound does not contribute to biological oxygen demand in the water being treated. The substances are highly inert, and are utilized for their highly adsorbant characteristics. The rate of adsorption is high, and retention of adsorbed oily materials has also been found to be unusually high. An oil slick may be removed from the surface of a body of water by broadcasting the adsorbant compound upon the surface of the water. (Sinha-OEIS)
W77-03870

WASTE-ASSIMILATION STUDY OF KOSHKONONG CREEK BELOW SEWAGE-TREATMENT PLANT AT SUN PRAIRIE, WISCONSIN,
Geological Survey, Madison, Wis. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-03876

ABATEMENT OF NITRATE POLLUTION I
PUBLIC-SUPPLY WELL BY ANALYSIS
HYDROLOGIC CHARACTERISTICS,
Geological Survey, Laguna Niguel, Calif.
L. A. Eccles, J. M. Klein, and W. F. Hardt.
Ground Water, Vol 14, No 6, p 449-
November-December 1976. 6 fig, 3 ref.

Descriptors: *Water pollution sources, *Pat
pollutants, *Nitrates, *Groundwater, *Califo
Fertilizers, Citrus fruits, Water analysis, S
pling, Pumping, Water yield, Water pollution
trol, Methodology.
Identifiers: *Redlands(Calif).

High concentrations of dissolved nitrate in
ground water in the Redlands, California, vic
threaten public water supplies. Dissolved nit
nitrogen concentrations in water from
which frequently exceed 10 mg/liter, are attrib
to the previous applications of large quantiti
commercial nitrogen fertilizer on citrus crops.
city of Redlands public water-supply well f
wells 1 and 2 normally produce water with
solved nitrate-nitrogen concentrations of abo
and 30 mg/liter respectively. Well 1 is a la
capacity well capable of yielding 3,700 gal/min
is the major source of water in the well f
Chemical analyses of water collected from w
during the first 48-hour test showed an increa
dissolved nitrate-nitrogen from 4.1 mg/liter
maximum of almost 20 mg/liter. Dissolved nit
nitrogen concentrations during the 48-hour te
well 2 stayed constant at 30 mg/liter. Interpret
of the studies indicate that the upper zone of
ration is higher in concentration of disso
nitrate. To reduce the concentration of disso
nitrate in water from well 1, an inflatable pa
was placed in the casing at 480 feet to coin
with the bottom of the clayey interval. The pa
sealed off the upper part of the well and red
dissolved nitrate-nitrogen concentrations fro
to 4 mg/liter while only reducing well yield
3,700 to 2,600 gal/min. (Woodard-USGS)
W77-03879

AN EVALUATION OF SURFACE-MINE SPO
AREA RESTORATION IN WYOMING US
RAINFALL SIMULATION,
Geological Survey, Lakewood, Colo. W
Resources Div.
For primary bibliographic entry see Field 5B.
W77-03892

THE EFFECTS OF FRESHWATER INFL
ON HYDROLOGICAL AND BIOLOGI
PARAMETERS IN THE SAN ANTONIO
SYSTEM, TEXAS,
Texas Parks and Wildlife Dept., Austin. Co
Fisheries Branch.
For primary bibliographic entry see Field 2L.
W77-03897

ESTABLISHMENT OF OPERATIO
GUIDELINES FOR TEXAS COASTAL Z
MANAGEMENT. SPECIAL REPORT I: WA
QUALITY MODELLING AND MANAGEM
STUDIES FOR CORPUS CHRISTI BA
LARGE SYSTEM APPROACH,
Texas Univ., at Austin. Center for Researc
Water Resources.
For primary bibliographic entry see Field 5B.
W77-03898

A ZERO-RELATIVE-VELOCITY B
SKIMMER,
Shell Development Co., Houston, Tex. Pip
Research and Development Lab.
For primary bibliographic entry see Field 5C.
W77-03899

CHEMICAL HAZARDS RESPONSE INFOR
TION SYSTEM FOR MULTIMODAL

...ARY U. OF I. URBANA-CHAMPAIGN

ENTS (CHRISMA) (A REEVALUATION OF RIS FOR ALL MODES OF TRANSPORTA-ON),
tle (Arthur D.), Inc., Cambridge, Mass.
primary bibliographic entry see Field 5A.
7-03903

VELOPMENT OF FAST CURRENT OIL SPONSE SYSTEM,
ence Applications, Inc., McLean, Va.
P. Trentacoste.
ailable from the National Technical Informa- Service, Springfield, VA 22161 as AD-A014 , Price codes: A09 in paper copy, A01 in rofiche. U.S. Coast Guard Office of Research Development Report No. CG-D-34-75, March 5. 95 p, 13 tab, 6 ref. DOT-CG-40216-A.

scriptors: *Oil spills, *Oil pollution, *Water lution control, *Pollution abatement, *Water ources, Hydrofoils, Separation techniques, del studies.
ntifiers: *Outer Continental Shelf, Oil recovery tems, System design.

e primary objective of this work was to demon- te the feasibility of a new oil control/recovery tem concept in a fast current environment. This tem consists of two basic components, the con- l function (a vented hydrofoil) and a recovery ction (a rotating belt of polyurethane foam). e system is operated in the following manner: A n layer of oil and water is separated by and ses over the top of the lead hydrofoil. A large tion of the remaining water in the oil/water er is vented through a slot which separates the ding hydrofoil from the main hydrofoil. The aining oil/water flow, which now contains a her concentration of oil, passes over the main drofoil and is directed by a small ramp, placed he rear of the main hydrofoil, tangentially onto rotating belt of polyurethane foam. The water ins through the foam belt while retaining the oil il it is squeezed out and pumped to a storage ntainer. Numerous experiments were performed h both small and full scale models in calm, vy and choppy water conditions. Deficiencies the full scale hardware design limited the vice's operation to a small range of velocities; wever, an 80% overall throughput efficiency s achieved. Therefore, the results of this study ve shown that the vented drofoil/polyurethane foam belt oil con- l/recovery system is a viable one. (Sinha-OEIS)
7-03904

STS OF COAST GUARD DEVELOPED HIGH AS OIL RECOVERY SYSTEMS AT EPA IMSETT,
ast Guard, Washington, D.C.
J. Chang.
ailable from the National Technical Informa- n Service, Springfield, VA 22161 as AD-A014 , Price codes: A07 in paper copy, A01 in rofiche. Report No. CG-D-101-75, June 1975. p, 17 fig, 6 tab, 3 ref, 6 append. DOT-CG-520A and 41, 546A.

scriptors: *Oil pollution, *Oil spills, *Water lution control, *Baseline studies, Instrumenta- n, *Skimming, Pollution abatement, Separation hniques.
ntifiers: *Outer Continental Shelf, *Oil covery systems, Oil skimmers.

e full scale tank testing of Coast Guard veloped High Seas Oil Recovery Systems which s conducted at the Environmental Protection ency's Oil and Hazardous Materials Simulated vironmental Test Tank (EPA OHMSETT) in onardo, New Jersey is summarized. The tests re conducted during July through September of 4. The objectives of the tests were: (1) to obtain antitative and qualitative measures of per- mance for the Lockheed High Seas Oil covery System HSORS and the Ocean Systems Oil Recovery System 1000 (ORS 1000) and (2) to develop a standard test plan for the testing of oil skimmers. The tests were controlled and instrumented so as to give data on the oil recovery rate, oil recovery efficiency, and thruput efficiencies attained over a wide range of conditions. A description of the test apparatus, the standard test plan employed, the instrumentation used, and the data reduction and analysis are included in the report. (Sinha-OEIS)
W77-03905

THE HYDRODYNAMICS OF POROUS BARRIER OIL RECOVERY SYSTEMS,
Texas A and M Research Foundation, College Station.
D. J. Norton, and J. L. Rand.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A014 501, Price codes: A05 in paper copy, A01 in microfiche. U.S. Coast Guard Office of Research and Development, Report No. CG-D-146-75, July 1975. 73 p, 4 ref, append. DOT-CG-4244A.

Descriptors: *Oil pollution, *Hydrodynamics, *Pollution abatement, *Water pollution control, Currents, Separation techniques.
Identifiers: *Outer Continental Shelf, *Oil recovery systems, Porous barriers.

The porous barrier concept consists of a solid barrier with several upstream porous barriers. The porous barriers act to dissipate the energy of the flow through them and to divert flow under the solid barrier in a gradual manner. The use of the porous barriers allows operation of a solid barrier or boom in currents well above the critical speed for a single solid barrier. The success of the concept depends upon the number, type, and placement of the porous barriers. During the present investigation, some 20 porous materials were classified as to their drag properties. Velocity measurements were made between combinations of these barriers, and oil recovery tests were run. Data has been collected for free stream velocities from 0.8 to 5.0 fps. Both Diesel No. 2 and 140 wt. lube oil were employed. Tests in the Texas A and M flume indicated that virtually all the oil could be contained up to 4.5 fps for Diesel No. 2. Above that speed losses were noted for the configurations tested. Testing in the University of Michigan's flow channel facility for velocities up to 7 fps confirmed these observations with oil viscosities up to 580 centistokes. (Sinha-OEIS)
W77-03906

DEVELOPMENT OF AN OIL-WATER POLLUTION MONITORING SYSTEM,
Naval Postgraduate School, Monterey, Calif.
For primary bibliographic entry see Field 5A.
W77-03908

AN OIL SLICK SAMPLING SYSTEM,
Coast Guard Research and Development Center, Groton, Conn.
For primary bibliographic entry see Field 5A.
W77-03909

CRUDE OIL SPILLS RESEARCH. AN INVESTIGATION AND EVALUATION OF ANALYTICAL TECHNIQUES,
Bureau of Mines, Bartlesville, Okla. Bartlesville Energy Research Center.
For primary bibliographic entry see Field 5A.
W77-03910

MEASUREMENT OF VOLATILE AND NON-VOLATILE HYDROCARBONS IN SELECTED AREAS OF THE ATLANTIC OCEAN,
Exxon Research and Engineering Co., Linden, N.J. Analytical and Information Div.
For primary bibliographic entry see Field 5A.
W77-03911

FAST CURRENT OIL RESPONSE SYSTEM - STAGE I, SVROS DEVELOPMENT,
Hydronautic, Inc., Laurel, Md.
W. T. Lindenmuth, T. R. Sundaram, and A. M. Sinnarwalla.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A014 500, Price codes: A05 in paper copy, A01 in microfiche. U.S. Coast Guard, Office of Research and Development, Report No. CG-D-36-75, March 1975. 93 p, 28 fig, 1 tab, 12 ref. DOT-CG-40218-A.

Descriptors: *Oil spills, *Oil pollution, *Skimming, Resources development, *Baseline studies, Equipment, Water pollution treatment, *Pollution abatement.
Identifiers: Outer Continental Shelf, Oil recovery systems, Oil skimmers.

Combined theoretical and experimental studies show the effects of several parameters on the formation of a thickened pool of oil inside the Surface Velocity Retarder Oil Skimmer (SVROS), an energy absorbing device designed to recover thin oil slicks in high relative currents. This collection device is composed of an array of closely spaced flat plates that serve to gradually dissipate the kinetic energy of the oil/water inflow so that the oil can be collected without the entrainment losses typical of simple oil booms in currents exceeding about one knot. Model tests were performed in prototype scale with thin models of the device in an 80 foot long towing tank and in a recirculating flume. Test variables included velocity, oil type, slick thickness, and model geometry. The final model configuration utilized several interchangeable modules so that pool formation was controlled over the wide range of inflow parameters to optimize the purity and efficiency of oil withdrawal from the SVROS. Curves defining the recovery performance are presented that show essentially complete oil recovery up to 5 fps with thin slicks of light fuel oil such as Diesel fuel. Performance degrades with increases in velocity, viscosity and incident wave height. (Sinha-OEIS)
W77-03920

DETERMINING THE CONCENTRATION OF OIL IN WATER SAMPLES BY INFRARED SPECTROPHOTOMETRY, PHASE I - SAMPLE AGING STUDY,
Naval Ship Research and Development Center, Annapolis, Md. Materials Dept.
For primary bibliographic entry see Field 5A.
W77-03922

PORT COLLECTION AND SEPARATION FACILITIES FOR OILY WASTES. VOL VI. IMPACT OF OFFSHORE TERMINALS ON CONTIGUOUS PORTS,
Harris (Frederic R.), Inc., New York.
R. L. Forster, J. E. Moyer, and M. Lepeau.
Available from the National Technical Information Service, Springfield, VA 22161 as COM-75-10765, Price codes: A05 in paper copy, A01 in microfiche. U.S. Department of Commerce, Maritime Administration Report No. MA-GEN-970-75067, March 1975. 92 p, 5 fig, 44 ref, 2 append. 2-36202 Mod. 6.

Descriptors: *Oily water, *Oil pollution, *Water pollution, *Waste disposal, *Transportation water pollution sources.
Identifiers: Outer Continental Shelf, *Crude oil, Offshore terminals, Deepwater ports, Bilge water, Supertankers, Refineries, Tankers, Ports.

The impact of the energy crisis, embargoes and environmental concerns of transportation of crude oil and petroleum products to potential offshore receiving terminals is discussed. As the proposed refinery construction programs are directly related to offshore terminal construction, the import of the various refinery construction programs on offshore terminals and the movement of produce by product tankers is analyzed. Published plans

are separated into three categories: (1) refinery plans likely to be implemented: (2) refinery plans whose implementation is uncertain; and (3) refinery plans which are not likely to be implemented. The various ports on the three coasts are analyzed with respect to sizes of tankers that may be accommodated and a vessel mix is developed. From this mix and the forecast petroleum demand, tanker movement requirements are estimated. These estimates are used to develop four arrival matrices for 1980 and for 1985 -- for PAD I and PAD III. Three arrival matrices are developed for PAD V over the same period. From these matrices based on assumed enforcement of the 1973 IMCO Convention, the quantities of oily wastes likely to arrive at given ports on the three seacoasts are estimated. The types of offshore terminals are discussed and the various proposed sites are mentioned. The various proposed U.S. refineries are tabulated and classified as to likelihood of construction. (See also W76-05830 and W74-10357) (Sinha-OEIS)
W77-03923

ECONOMIC MODELING FOR WATER POLICY EVALUATION.
For primary bibliographic entry see Field 6A.
W77-03924

MODELING AND INFORMATION HANDLING IN ENVIRONMENTAL SCIENCE,
American Univ., Washington, D. C. Coll. of Public Affairs.
M. Sager.
In: Economic Modeling for Water Policy Evaluation (Ed. by Robert M. Thrall, et al.) North-Holland/TIMS Studies in the Management Sciences, Vol. 3, North-Holland/American Elsevier, New York, N.Y., 1976, p 21-28. 1 fig, 1 tab, 1 ref.

Descriptors: *Water pollution control, *Model studies, *Water resources development, History, Environment, Water policy, Simulation analysis, Optimization, Systems analysis, Legislation.
Identifiers: Environmental science, Information handling.

This paper reviews the current status of modeling efforts in water resources development, with particular emphasis on water quality. After giving a history of mandatory water pollution control and the science of information handling, water resources modeling is categorized and discussed: the two model categories identified are descriptive and management. An outline is presented of water resources models currently on line; considered are model/decision area (i.e., regional water supply analysis), general type (i.e., linear programming), and important characteristics (i.e., finds optimal supply investment for a given demand). Finally, substantive issues for which solutions have not yet been found are listed. It is concluded that the first several years of our national efforts at meeting the legislative mandate for control of the national water pollution problems have been successful as far as definitive isolation of problem areas. (See also W77-03924) (Bell-Cornell)
W77-03926

MODELS OF AGRICULTURAL WATER, LAND USE AND THE ENVIRONMENT,
Iowa State Univ., Ames.
For primary bibliographic entry see Field 6A.
W77-03927

WATER QUALITY MANAGEMENT AND THE DISTRIBUTION OF EMISSION RIGHTS BY SEALED TENDER MARKETS,
Geological Survey, Washington, D. C.
E. D. Attanasi.
In: Economic Modeling for Water Policy Evaluation (Ed. by Robert M. Thrall et al.) North-Holland/TIMS Studies in the Management Sciences, Holland/American Elsevier, New York, N.Y., p 113-123, 1976. 1 fig, 1 ref, 1 append.

Descriptors: *Water quality control, *Management, *Economics, *Pricing, Reach(Streams), River basins, Planning, Treatment, Costs, Decision making, Mathematical models, Equations, Systems analysis.
Identifiers: *Firm model, Bidding strategies, Emission rights.

As an alternative to water quality management by effluent standards or charges, this paper presents a sequential bidding model used to investigate firm responses to alternative River Basin Authority (RBA) regulatory controls, taxation measures and institutional arrangements when emission rights are allocated by sealed tender markets. The results suggest that because such measures influence bid levels, observed bid prices will not generally represent the bidder's marginal costs of waste treatment. A description of the assumed institutional structure and the firm model are given. Short-run bidding strategies are derived and related to market regulation policies where it is assumed that the emission rights are distributed on the basis of individual stream reaches. Alternative regulatory policies are evaluated in terms of their potential for control of economic rents accruing to firms exploiting a public resource and induced influence on bid prices. Implications of the analysis for utilization of both informational and allocative functions of the market for basin-wide planning decisions are also discussed. The assimilative capacity of a stream is considered as a public resource. The model assumes a linear utility and is assumed to maximize some criterion function over a planning bidding situations. Results suggest that observed bids not only reflect marginal costs of internal waste treatment but also risk attitudes, market conditions and RBA taxation policies. (See also W77-03924) (Bell-Cornell)
W77-03931

INCORPORATING OUTDOOR RECREATION IN A MODEL OF STREAM FLOW REGULATION AND WATER QUALITY IMPROVEMENT,
Technion-Israel Inst. of Tech., Haifa.
M. Barnea, U. Shamir, and M. Shechter.
In: Economic Modeling for Water Policy Evaluation (Ed. by Robert M. Thrall et al.) North-Holland/TIMS Studies in the Management Sciences, Vol. 3, North-Holland/American Elsevier, New York, N.Y., p 125-155, 1976. 5 fig, 1 tab, 31 ref.

Descriptors: *Water quality control, *Recreation, *Demand, *Streamflow, *Regulation, *Simulation analysis, Improvement, Semiarid climates, *Water pollution control, *Water resources, Estimating, Benefits, Irrigation, Sewage treatment, Equations, Mathematical models, Systems analysis, Economics, Forecasting.

Considered is the outdoor recreation demand relating to water-oriented activities in semi-arid Israel. This paper investigates the possibilities of incorporating outdoor recreation among other uses of water bodies situated in the relative vicinity of dense urban centers. An existing sewage treatment problem is reformulated as a comprehensive model of streamflow regulation and water quality control, which includes recreation as a major output. The novelty of this approach lies in the explicit incorporation of a demand submodel for predicting attendance at, and evaluating benefits of, water-based outdoor recreation activities within the framework of the comprehensive model. Discussed is the nature of recreation as an economic good, yielding real benefits to individuals. Described is a model of the river basin and streamflow modification, in which recreation is one of the major outputs in addition to irrigation, industrial, and household uses of fresh water and treated effluents. The inputs are natural inflows, industrial and domestic effluents, recycled water from the river itself, and interregional transfers. The flow and quality regulation system includes reservoirs for recreational activities, water treatment, and natural flow catchment, treatment plants, and a conduit system for recycling a water transfers. The problem is solved via no stochastic computer simulation. The objecti function sums up the benefits from project o puts. The technique developed could be used conjunction with an optimization model. (See al W77-03924) (Bell-Cornell)
W77-03932

MODELING PROCESS SUBSTITUTIONS BY AND MIP,
Resources for the Future, Inc., Washington, D.
J. W. Sawyer, Jr., B. T. Bower, and G. O. G. Lof
In: Economic Modeling for Water Policy Evalu tion (Ed. by Robert M. Thrall, et al.) North-H land/TIMS Studies in the Management Scienc Vol. 3, North-Holland/American Elsevier, N York, N.Y., p 157-178, 1976. 3 fig, 8 tab, 9 ref append.

Descriptors: *Water quality control, *Waste wa disposal, *Linear programming, *Manageme *Industrial wastes, Alternative planning, timization, Economics, Effluents, Streams, Cos Waste water treatment, Constraints, Biochemi oxygen demand, Suspended solids, Equatio Mathematical models, Systems analysis.
Identifiers: *Mixed integer programming, C minimization, Paper industry, Waterbo residuals, Lower Delaware Valley, Residu reduction.

Investigated are formulations for modeling liq residuals management in industrial plants. Lin programming (LP) and mixed integer programm (MIP) formulations are presented for liq residuals modification activities in a single pl involving the removal of two or more materi the removals of which may be interactive, wh occur concurrently, and whose marginal costs removal vary with the level of both of the act ties. The linear programming model compactly presses some water quality processing technol alternatives for paper mills and the costs of wa quality consequences of some of the various liq residuals modification alternatives which can employed. The model is designed as a submode the Resources for the Future's Lower Delaw Valley Model, and is therefore designed to co bine with a waste paper availability model, an pollution model, and a model of the Delaw Estuary aquatic ecosystem. The MIP is discus in terms of its advantages and disadvanta Results of both the LP and the MIP formulati for finding the minimum cost alternatives given. It is concluded that if the number of inte variables is relatively small (about 10 or less), models are preferable. For large numbers of teger variables, reduce the number of variable those which are most important or use an LP mulation. (See also W77-03924) (Bell-Cornell)
W77-03933

QUASI-PUBLIC GOODS: PRICING THE CO MONS,
Ohio State Univ., Columbus.
For primary bibliographic entry see Field 6A.
W77-03936

PROCEEDINGS FOR SECOND ANNUAL C FERENCE ON THE RESTORATION COASTAL VEGETATION IN FLORIDA.
Hillsborough Community Coll., Tampa, Fla.
Held on May 17, 1975 at Hillsborough Commu College, Tampa, Florida. Edited by R. R. Le III.

Descriptors: *Intertidal areas, *Conferen *Mangrove Swamps, *Reforestati *Revegetation, *Planting management, *Flor Trees, Salt marshes, Erosion control, Vegeta establishment, Estuaries, Tidal effects, Gro rates, Spoil banks, Bays, Succession, Gras Federal Water Pollution Control Act, Naviga waters, Vegetation regrowth.

ntifiers: *Seagrass, *Mangrove, Halodule ghtii, Thalassia testudinum, Corps of En- ers, Rhizophora mangle, Avicennia ger- ans, Laguncularia racemosa, Spartina alter- ora, Propagation.

ference topics ranged from implications of the eral Water Pollution Control Act Amendments 972 with respect to the Corps of Engineers' nition of 'navigable waters,' to revegetation of aries, bays, and canal banks by Thalassia udinum and Spartina alterniflora and reforesta- by three species of mangroves--Rhizophora gle (red), Laguncularia racemosa (white), and cennia germinans (black). Substrate, site loca- , propagation, secondary succession, and splantation techniques are discussed for both herbaceous vegetation and the trees. The me is supplemented by bibliographies on aculture containing 10 citations; on the ecology alophytes containing 27 citations; and 22 titles ontributions to the first annual conference on restoration of coastal vegetation in Florida in 1974. A general reference on subjects re- d to coastal stabilization and coastal flora con- s 80 citations; salt marsh ecology and flora are d in 56 references; seagrasses are discussed in references; and mangroves in 27. (See W77- 43 thru W77-03952) (Auen-Wisconsin)
7-03942

YNOTE SPEECH, SECOND ANNUAL CON- RENCE ON RESTORATION OF COASTAL GETATION IN FLORIDA,
vironmental Protection Agency, Atlanta, Ga.
. Turnipseed.
Proceedings for Second Annual Conference on Restoration of Coastal Vegetation in Florida, y 17, 1975, Hillsborough Community College, mpa, Florida, p 3-11.

scriptors: *Florida, *Coastal marshes, *Federal ter Pollution Control Act, *Jurisdiction, avigable waters, Judicial decisions, Tidal rshes, Tidal waters, Land forming, Inland erways, Permits, Landfills, Legal aspects, ter rights.
ntifiers: *Corps of Engineers, Dredged spoil posal.

e disinclination of the Corps of Engineers to mply with the provisions of the Federal Water lution Control Act Amendments of 1972 as re- d to disposal of dredged and fill materials in l wetlands and the Corps jurisdiction and inition of 'navigable waters' is discussed. In an ort to define its jurisdiction the Corps published r alternatives to its proposed regulations. The rps preferential Altervative IV is faulted in t tributaries outside of primary tributaries are recognized; that the extent of regulation of the n streams and primary tributaries is limited to reach of the high water mark; and the rigid s required for state certification before the rps will process a permit application. However, concepts of jurisdiction contained in Alterna- I agree with the Act's definition of 'navigable ers' and recent court decisions; it also en- rages state participation in the permitting cess under Section 404 of the Act, which is not nded to ban all filling activities but is legislated rotect the intertidal wetland ecosystems from ricious destruction. Any alternative chosen n the four choices submitted by the Corps will evaluated in the context of final guidelines lished by the EPA. (See also W77-03942) en-Wisconsin)
7-03943

VEGETATION OF THALASSIA TESTU- NUM IN A MULTIPLE-STRESSED ESTUA- , NORTH BISCAYNE BAY, FLORIDA,
mi Univ., Fla. Dept. of Microbiology.
Thorhaug, and R. Hixon.
Proceedings for Second Annual Conference on Restoration of Coastal Vegetation in Florida, May 17, 1975, Hillsborough Community College, Tampa, Florida, p 12-27. 2 fig, 1 tab, 12 ref.

Descriptors: *Revegetation, *Estuaries, *Bays, *Florida, Spoil banks, Dredging, Vegetation establishment, Marine plants, Benthic flora, Vegetation regrowth, Currents(Water), Waves(Water), Turbidity, Suspension.
Identifiers: *Seagrass, Thalassia testudinum, *North Biscayne Bay(Fla), Turtle grass.

Investigations with seagrass revegetation of North Biscayne Bay, to enhance productivity reduced by dredging, dredged materials, filling, and channeling with seedlings of the endemic Thalassia testudinum, are described. Plant survival and growth in eight test locations indicated that they are dependent on tidal currents, wave action induced by oceanic surf and the wake of large boats, inducing sediment suspension and turbidity. The substrate type was another important variable; sediments in the gravel particle size did not support abundant or diverse vegetation as compared to finer particle size; muddy sediments supported better growth than pure sand. The rapid regrowth of secondary (or pioneer) seagrass in several of the monitored areas indicated that nutrient availability, light and level of pollutants would be sufficient for the turtle grass growth if plants could be reestablished. A major factor contributing to the absence of Thalassia in the north bay is that the turtle grass population in South Biscayne Bay is not a prolifically-fruiting colony. For Thalassia to reestablish itself naturally, either seeds or apical meristems would have to reinvade the basins of North Biscayne Bay, but meristem reinvasion appears to be unlikely because of the deep turbid areas between the basins. However manual revegetation appears to be promising. (See also W77-03942) (Auen-Wisconsin)
W77-03944

SEAGRASS REVEGETATION ATTEMPTS IN ESCAMBIA BAY, FLORIDA, DURING 1974,
Environmental Protection Agency, Sabine Island, Fla. Escambia Bay Recovery Study.
R. G. Rogers, and F. T. Bisterfeld.
In: Proceedings for Second Annual Conference on the Restoration of Coastal Vegetation in Florida, May 17, 1975, Hillsborough Community College, Tampa, Florida, p 28-34. 12 ref.

Descriptors: *Revegetation, *Estuaries, *Bays, *Florida, Planting management, Vegetation establishment, Marine plants, Benthic flora, Vegetation regrowth.
Identifiers: *Seagrass, Halodule wrightii, *Escambia Bay(Fla), Shoal grass.

The revegetation of Escambia Bay with the low salinity-tolerant Halodule wrightii is described. This species is hardy, is able to inhabit intertidal areas, and survives short exposures to air. A plug with a 7.5 cm diameter and 12.5 cm depth of H. wrightii was obtained from a healthy bed in adjacent East Bay and placed into snug fitting burlap bags. Light, tight containers were used to transport the plug, which was replanted within three hours. Transplants were placed at five depths ranging from 0.3 to 1.0 m (1 to 3 ft) MSL at 0.15 m (0.5 ft) intervals. Ten plugs were planted at each depth during July and September. A total of 100 plugs per site and 400 plugs were planted in all. Survival for the July transplants after 13 weeks was 51%. Plugs transplanted in September showed a 67% survival after six weeks. Excessive sand transport inhibited growth rates and survival in one site. After overwintering 37% had green leaves at one site; another site had less that 10% survival; however, the leaves were free of encumbrance, indicating recent new spring growth and other plugs may sprout out as the water warms. (See also W77-03942) (Auen-Wisconsin)
W77-03945

LOSS OF SUBMERGED VEGETATION IN THE PENSACOLA BAY SYSTEM,
Environmental Protection Agency, Sabine Island, Fla. Escambia Bay Recovery Study.
R. G. Rogers, and F. T. Bisterfeld.
In: Proceedings for Second Annual Conference on the Restoration of Coastal Vegetation in Florida, May 17, 1975, Hillsborough Community College, Tampa, Florida, p. 36-50. 5 fig., 6 ref.

Descriptors: *Aerial photography, *Vegetation, *Estuaries, *Bays, *Distribution, *Florida, Marine plants, Benthic flora, Mapping, Pollutant identification.
Identifiers: Seagrass, *Pensacola estuary(Fla).

Aerial photography conducted in 1974 and indicating the extent of vegetation loss since 1949 showed that all seagrasses (Thalassia and Halodule) were gone except for one bed on the northeast shore of East Bay. This had diminished significantly but was persisting. This shoreline was the least altered by man and seemed to have the least beach erosion. The other persistent specie was Vallisneria americana, essentially a freshwater specie, which appeared to be thriving but had diminished in the upper Escambia Bay. In 1974 and 1975 there had been an expansion of Vallisneria in the Escambia delta area. The vegetation loss is attributed to the synergistic effects of sewage and industrial waste effluents, dredging and filling, beachfront alteration and changing watershed characteristics. Along the southern shore of East Bay bulkheads and groins likely caused changes in nearshore water movement and, consequently, erosion of seagrass beds. Industrial wastes affected the vegetation in the northeast section of Escambia Bay since these effluents remain near shore in that area. The only location where seagrasses had remained relatively stable was Santa Rosa Sound. This area should be considered as endangered, however, and efforts should be made to preserve the integrity of these seagrass beds. (See also W77-03942) (Auen-Wisconsin)
W77-03946

PATTERNS OF SECONDARY SUCCESSION IN A MANGROVE COMMUNITY, TAMPA BAY, FLORIDA,
East Stroudsburg State Coll., Pa. Dept. of Biology.
T. Detweiler, F. M. Dunstan, R. R. Lewis, and W. K. Fehring.
In: Proceedings for Second Annual Conference on the Restoration of Coastal Vegetation in Florida, May 17, 1975, Hillsborough Community College, Tampa, Florida, p. 52-80. 12 fig., 3 tab., 19 ref.

Descriptors: *Mangrove swamps, *Tidal marshes, *Succession, *Revegetation, *Florida, Intertidal areas, Reforestation.
Identifiers: *Mangroves, Tampa Bay(Fla), Rhizophora mangle, Avicennia germinans, Laguncularia racemosa.

A mangrove community, first disturbed by mosquito ditching then by bulldozing, on the eastern shoreline of Tampa Bay was investigated to determine its secondary succession. While Laguncularia racemosa (white mangrove), Avicennia germinans (black mangrove), and Rhizophora mangle (red mangrove), in that order, were the major species in an adjacent relatively-undisturbed control area, Salicornia virginica and Spartina alterniflora predominated in the early secondary succession pattern of the affected study area. A. germinans and L. racemosa were recovering well, but R. mangle recovery appeared very slow. The herbaceous plants, S. virginica increased its abundance and distribution along the elevation gradient while Batic maritima was restricted to its former abundance and expansion range. An interesting relationship was observed between the distribution of the vegetation in both areas and the recognition of the mean high water line (+1.5 ft SLD). The distribution elevation was 1.64 ft SLD for all vegetation in the control area but in the disturbed area the distribution was at the

+1.55 ft SLD. It was presumed that B. maritima and S. virginica were at their peak of seaward expansion but S. alterniflora may expand into the former R. mangle zone (low marsh). Total recovery, based on the size of the trees destroyed, is expected to be within 50-75 years. (See also W77-03942) (Auen-Wisconsin)
W77-03947

THE POSSIBLE ROLE OF SPARTINA ALTERNIFLORA LOISEL IN ESTABLISHMENT OF MANGROVES IN FLORIDA,
Hillsborough Community Coll., Tampa, Fla. Dept. of Biology.
R. R. Lewis, and F. M. Dunstan.
In: Proceedings for Second Annual Conference on the Restoration of Coastal Vegetation in Florida, May 17, 1975, Hillsborough Community College, Tampa, Florida, p. 82-100. 13 fig., 19 ref.

Descriptors: *Succession, *Revegetation, *Intertidal areas, Estuaries, Bays, Spoil banks, Mangrove swamps, Islands, Reforestation, Vegetation establishment, *Florida, Grasses.
Identifiers: *Spartina alterniflora, *Mangroves, *Tampa Bay(Fla), Cord grass.

The potential importance of Spartina alterniflora as part of the successional pattern of mangroves is examined in investigations of four sites in eastern Tampa Bay: two spoil islands, a natural mangrove island and a mangrove forest cleared in 1971 and now in the process of secondary succession. A 'doughnut' effect observed in the Spartina colonization is due to the contrast between one year's flowering stems and the following year's new growth, which is consistent with the primary means of reproduction by rhizomes. Examination of these 'doughnuts' showed young mangrove seedlings located in the center. All three mangroves (Rhizophora mangle, Avicennia germinans, and Laguncularia racemosa) were found. There was also evidence of shading out and elimination of some Spartina by the larger mangroves. The implication is that when considering planting vegetation on spoil material, the natural successional pattern of the specific site should be considered to determine the best approach. When compared with the generally slow growing characteristics of mangroves, particularly in Tampa Bay, it is apparent that the initial use of S. alterniflora on spoil material would be more advantageous as opposed to direct plantings of mangroves. (See also W77-03942) (Auen-Wisconsin)
W77-03948

EFFORTS IN MARINE REVEGETATION IN ARTIFICIAL HABITATS,
Marco Applied Marine Ecology Station, Marco Island, Fla.
J. C. Kinch.
In: Proceedings for Second Annual Conference on the Restoration of Coastal Vegetation in Florida, May 17, 1975, Hillsborough Community College, Tampa, Florida, p. 102-111. 2 fig., 1 tab., 1 ref.

Descriptors: *Revegetation, *Spoil banks, *Intertidal areas, Bays, *Florida, Growth rates, Vegetation establishment, Islands, Canals, Reforestation, Vegetation regrowth.
Identifiers: Marco Island(Fla), *Roberts Bay(Fla), Mangrove, Seagrass, Thalassia testudinum.

Revegetation attempts with mangroves on two spoil islands in Roberts Bay (Florida) and with the seagrass Thalassia on the submerged slopes of seawalled canals, are detailed. During 1972-1973, 2477 mangrove trees 2-3 ft and 4-8 ft in height with 8-15 in. root balls were planted on the islands. The transplants grew less than half of trees in a natural site. After three years, only 389 trees survived (15.7%) of the total planted. The high mortality is variously attributed to the unconsolidated substrate of the islands, loss of elevation which increased erosion, and possibly extreme exposure to wind and sun. Thalassia transplants on the submerged slopes of the canals required secure anchorage to ensure viability. The method consisted of planting individual short shoots of the plant without its rhizome and tying the shoot to a short length of construction tie rod. Two four-week old plots exhibited high mortality and poor viability, although one five-week old plot lost only 20% of the plants with the remaining in good condition. The low success is attributed to the substrate and lack of care in planting. Treatment with napthalene acetic acid and careful planting site preparation should enhance survival of subsequent plantings. (See also W77-03942) (Auen-Wisconsin)
W77-03949

ASPECTS OF RED MANGROVE REFORESTATION IN FLORIDA,
Florida Inst. of Tech., Jensen Beach. Environmental Studies.
J. Hannan.
In: Proceedings for Second Annual Conference on the Restoration of Coastal Vegetation in Florida, May 17, 1975, Hillsborough Community College, Tampa, Florida, p. 112-121. 5 ref.

Descriptors: *Mangrove swamps, *Reforestation, *Florida, Trees, Intertidal areas, Estuaries, Erosion, Tidal effects, Growth rates, Vegetation regrowth.
Identifiers: Mangrove, Rhizophora mangle, *Indian River(Fla), *Red mangrove.

Experimental plantings of red mangrove (Rhizophora mangle) in the vicinity of St. Lucie Inlet in the Indian River (Florida) generated the following conclusions: Four- to six-year old trees are preferred to seedlings, because among other destructive forces, seedlings are destroyed by wave thrown objects. Planting-size trees can be obtained from mosquito impoundment ditch banks, where they are usually killed at sporadic intervals during ditch repairs. The root-ball method of transplanting produces excellent results (80% to 100% survival) when planted at the natural depth, with leaves intact. Planting two to four inches deeper causes high mortality and retards growth. Leaf stripping of new transplants results in an initial spurt of growth, but subsequently leaf-stripped plants does not match leaf production of control groups. The isopod Sphaeroma killed all trees planted below the mid-tidal zone in the Indian River. Erosion was not controlled by the transplanted trees at any site. Trees fell if the sand around their roots was washed away in conjunction with overall beach erosion; tires were of no help in preventing this. Wind exposure had no effect on leaf production. Transplants survived only at a site protected from wind and waves, but more importantly, because Sphaeroma populations were reduced due to low dissolved oxygen levels at night. (See also W77-03942) (Auen-Wisconsin)
W77-03950

SUGGESTED MANGROVE TRANSPLANTING TECHNIQUES,
Florida Dept. of Natural Resources, St. Petersburg. Marine Research Lab.
T. R. Pulver.
In: Proceedings for Second Annual Conference on the Restoration of Coastal Vegetation in Florida, May 17, 1975, Hillsborough Community College, Tampa, Florida, p. 122-131. 1 fig., 3 ref.

Descriptors: *Reforestation, *Mangrove swamps, *Planting management, *Florida, Trees, Intertidal areas, Salt marshes, Root development.
Identifiers: Mangroves, Rhizophora mangle, Laguncularia racemosa, Propagation, Avicennia germinans.

Handling and planting experiments indicated that 0.5 to 1.5 m high mangrove trees (Rhizophora mangle, Avicennia germinans, Laguncularia racemosa) could successfully be used as transplant stock in coastal restoration programs. Pruning enhanced replant recovery in each species, yielding slightly less defoliation and more growth than with unpruned transplants. Survival rates were excellent. A root ball diameter approximately one-half of the original tree height is generally sufficient to sustain a 0.5 to 1.5 m mangrove through the recovery period; Rhizophora proproots should be included in the root ball when possible; if severed they should be left on the tree without further pruning for possible regrowth. The root covering soil should be watered, especially in less inundated areas and when settled, the tree should be at approximately the original groundlevel. Pneumatophores or proproots should be uncovered to maintain aeration of subterranean roots. Planting of mixed stands is advisable to gain all the advantages offered by each species. Presence of scattered mangroves, established seedlings, other salt marsh vegetation, or fine muddy substrate are natural indicators of favorable substrate stability. Trees may be propagated by air layering or rooted cuttings to produce a faster nursery stock. Every second tree (0.5 to 1.5 m size class) in naturally dense stands can be removed for transplant stock providing that care is taken in the removal process. (See also W77-03942) (Auen-Wisconsin)
W77-03951

PLANTINGS OF RED MANGROVE (RHIZOPHORA MANGLE L.) IN CHARLOTTE AND ST. LUCIE COUNTIES, FLORIDA,
Miami Univ., Coral Gables. Dept. of Biology.
H. J. Teas, W. Jurgens, and M. C. Kimball.
In: Proceedings for Second Annual Conference on the Restoration of Coastal Vegetation in Florida, May 17, 1975, Hillsborough Community College, Tampa, Florida, p. 132-161. 16 fig., 16 ref.

Descriptors: *Mangrove swamps, *Reforestation, *Intertidal areas, *Planting management, *Florida, Salt marshes, Estuaries, Revegetation, Trees, Erosion control, Vegetation establishment, Social aspects.
Identifiers: Mangrove, Rhizophora mangle, Charlotte County(Fla), St. Lucie County(Fla), *Coral Reef Waterway(Fla), Human despoliation, *Red mangrove.

Factors that affected the survival of red mangrove seedlings hand-planted at three sites for shoreline stabilization and at one site for restoration of a tidal creek, are detailed. Probably the most important such factor was the shoreline energy--the sum of forces applied by waves, wind, currents, and boat wakes. Human despoliation was a major problem in seedling establishment in the more urbanized areas. Planting through jute mesh was ineffective in stabilizing seedlings at a moderate energy shore. Elevation in relation to tidal level was a significant factor as seedlings successfully established in low energy areas at elevations ranging from mean high water to mean low water. Competition from natural white and black mangrove seedlings was partly a function of tidal elevation. Experimental plantings that extended above the mean high tide level and below the mean low tide level will have a lower survival rate than more conservative plantings. The size of the seedlings did not substantially influence establishment as seedlings at all stages of development were easily dislodged from high and moderate energy areas. Plantings were not adversely affected by non-marine fill material but optimum mangrove growth occurs on soils containing high levels of organic matter and nutrients. (See also W77-03942) (Auen-Wisconsin)
W77-03952

A NOTE ON EFFLUENT CHARGES AND MARKET STRUCTURE,
State Univ. of New York at Binghamton. Economic Growth Inst.
V. K. Smith.
Journal of Environmental Economics and Management, Vol. 2, No. 4, p. 309-311, 1976. 8 ref.

ptors: *Pollution abatement, *Pollution Charges), Market value, Economics, Taxes, tion.
iers: *Effluent charges, *Market structure.

examination of the role of the market struc- n setting effluent charges, comparison is of tax systems based on minimizing the ce input costs of pollution abatement, ver- x systems which also consider the value of tput vectors associated with pre-tax and x allocations. A simple model is developed shows that efficient resource allocation in esence of product market distortions and a on externality requires two policy instru- In the study, discussion is given concerning eements among environmental economists ing the usefulness of Pigouvian taxes as cor- instruments for external diseconomies in on reduction by private sector organiza- Definitions of costs are compared, as d from analysis of two philosophies of ef- charges: (1) that a tax rate set at a level that es the desired reduction in the total emis- of pollutants will satisfy the necessary condi- or the minimization of the program's cost to ; and (2) that imposing the same per unit on tax on each firm will not result in a um cost reduction in pollution. (Harris- nsin)
3955

UTION, WELFARE, AND ENVIRONMEN- POLICY IN THE THEORY OF COMPARA- ADVANTAGE,
western Univ., Evanston, Ill. Center for matical Studies in Economics and Manage- Science.
imary bibliographic entry see Field 6G.
3958

UENT CHARGES AND LICENSES UNDER RTAINTY,
rd Univ., Cambridge, Mass. Dept. of omics.
Roberts, and M. Spence.
al of Public Economics, Vol. 5, No. 3-4, p. 8, 1976. 5 fig., 1 tab., 4 ref. NSF GS-39004.

iptors: *Permits, *Pollution abatement, ution taxes(Charges), Economics, Taxes, et value, Regulation, Costs.
fiers: *Effluent charges, nses(Pollution).

ion control systems based on use of effluent es are studied under special conditions when atory authorities are uncertain about the which would have to be borne by private sec- ms in cleanup activities. A mixed system, in- g effluent charges and restrictions on the quantity of emissions through use of mar- le licenses, is preferable to either effluent r the licenses used separately. This is based e assumption that a mixed system permits the cit penalty function imposed on the private r to more closely approximate the expected ge function for pollution at each level of total output. A model is described and a mixed ef- fee and license scheme is analyzed in which egulatory authority has three manipulable eters: a subsidy, a penalty and a stock of es. The authority knows that pollution will the stock of licenses, provided the market turns out to be between the subsidy and the ty. The subsidy provides a residual incentive rms to clean up even more when costs are The finite penalty provides an escape valve in costs are very high. The aggregate damage ion is approximated by a piece-wise linear ty function. But once the equilibrium in e prices is established, each firm effectively a linear penalty function whose slope is the of the license. As a result, marginal cleanup are equalized and total cleanup costs are nized. (Harris-Wisconsin)
03959

PUBLIC CHOICE AND URBAN WATER QUALITY,
Georgia Univ., Athens.
For primary bibliographic entry see Field 6B.
W77-03960

EXAMINATION OF ENVIRONMENTAL POLICIES USING PRODUCTION AND POLLUTION MICROPARAMETER DISTRIBUTIONS,
Tel-Aviv Univ. (Israel). Foerder Inst. for Economic Research.
For primary bibliographic entry see Field 6G.
W77-03961

THE SYMMETRY OF EFFLUENT CHARGES AND SUBSIDIES FOR POLLUTION CONTROL,
Toronto Univ. (Ontario). Inst. for Environmental Studies and Engineering.
D. N. Dewees, and W. A. Sims.
Canadian Journal of Economics, Vol. IX, No. 2, p. 323-331, 1976. 3 fig., 14 ref.

Descriptors: *Pollution abatement, *Pollution taxes(Charges), Prices, *Costs, Efficiences, Evaluation, Feasibility, Government supports, Water pollution control.
Identifiers: *Effluent charges, Subsidy.

Whether a subsidy paid to polluters who reduce their emissions has the same efficiency characteristics as an effluent charge is examined. It is concluded that the symmetry between the types of pollution control is not merely limited; it is non-existent. Three sources of asymmetry were found. First, the short-run problem of finding a base point from which the subsidy should be paid necessitates an estimation of what would have been emitted in the absence of the subsidy. The second source of asymmetry involves entry to or exit from the industry. Since a subsidy scheme which raises prices encourages entry, subsidizing potential entrants and exitors could bankrupt the pollution control authority. If on the other hand only active firms were subsidized, emissions are likely to be increased over unregulated levels. Both of these postulates are compounded by a third set of problems, based on the fact that the subsidy is discontinuous. This discontinuity means that the marginal cost curve must be discontinuous, and the average cost curve altered. The revised cost curves mean that the firm output will be larger than without intervention, and in the only possibly symmetrical case, price will be lower and industry emissions higher than those in the effluent charge case. (Luedtke-Wisconsin)
W77-03962

IRRIGATION EFFICIENCY, A BIBLIOGRAPHY, VOLUME 2.
Office of Water Research and Technology, Washington, D. C.
For primary bibliographic entry see Field 3F.
W77-03968

THE APPLICATION OF BOREHOLE GEOPHYSICS TO THE SELECTION AND MONITORING OF NUCLEAR WASTE DISPOSAL SITES,
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 5E.
W77-03970

APPLICATION OF GAME THEORY IN WATER MANAGEMENT,
Water Resources Center, Budapest (Hungary).
For primary bibliographic entry see Field 6A.
W77-04009

A SCIENTIFIC BASIS FOR DETERMINING RECREATIONAL WATER QUALITY CRITERIA,
Lockheed Missiles and Space Inc., Sunnyvale, Calif.
R. H. Dudley, K. K. Hekimian, and B. J. Mechalas.
Journal of the Water Pollution Control Federation, Vol. 48, No. 12, p 2761-2777, December 1976. 6 fig, 10 tab, 23 ref.

Descriptors: *Water quality control, *Salmonella, *Recreation, Risks, Data collections, Histograms, Coliforms, Mathematical models, Systems analysis, *Water quality standards.
Identifiers: Dose.

The development and application of a scientific methodology to evaluate risk to water recreationists as a function of each independent environmental factor is described. A mathematical model was developed to assess the risk of ill effect to a recreationist entering or using a body of water having a given hazard distribution. Herein, the incorporation of all relevant published data into the methodology using the factor Salmonella as an example is illustrated. That is, the study correlates all known published: (1) dose-response data for Salmonella; (2) measurements of Salmonella in water; and (3) estimates of risk of illness as a function of Salmonella in water. The result is a curve of the quantitative risk to the recreationist as a function of the two Salmonella subfactor criteria. (Bell-Cornell)
W77-04011

FORECASTINGS A LINE OF INVESTIGATIONS OF MEMBER COUNTRIES OF THE COUNCIL OF MUTUAL ECONOMIC ASSISTANCE IN THE AREA OF ENVIRONMENTAL HYGIENE, (IN RUSSIAN),
Institute of General and Municipal Hygiene, Moscow (USSR).
G. I. Sidorenko, E. K. Strizhak, and N. A. Rakhmanina.
Gig Sanit 9, p 86-90, 1975.

Descriptors: *Forecasting, *Public health, Cities, Rural areas, Population, *Environmental effects, *Air pollution, *Water pollution, Water supply, Soils, Microorganisms, Foreign countries.

Hygienic forecasting is gaining importance in connection with the development of cities and populated rural areas and increase of environmental pollution. A 1971 agreement on scientific and technical collaboration among member countries of the Council of Mutual Economic Assistance calls for joint studies of environmental protection, air quality in populated areas, water supply quality of populated areas, soil quality, noise and microbial pollution. Developments in these areas of investigation are forecast to the year 1990.--Copyright 1976, Biological Abstracts, Inc.
W77-04016

NONPOINT SOURCES OF POLLUTION: A FEDERAL PERSPECTIVE,
Environmental Protection Agency, Washington, D. C. Div. of Water Planning.
M. A. Pisano.
Journal of the Environmental Engineering Division, Proceedings of the American Society of Civil Engineers, Vol. 102, No. EE3, Proceedings paper 12211, p 555-565, June 1976. 3 tab.

Descriptors: *Water pollution control, *Water quality, *Runoff, *Sedimentation, *Land use, *Silts, *Storm drains, Hydrology, Irrigation, Sediments, Mining, Natural resources, Conservation, Water resources, Legislation, Federal government, Planning.

The magnitude of the nonpoint source problem nationwide calls for the establishment of State, local, and Federal measures to control existing sources

and to prevent future stream degradation from additional nonpoint sources. Under the Environmental Protection Agency's (EPA) regulations, State and local water quality management agencies have the major responsibility for the planning and implementation of nonpoint source programs. Emphasis of nonpoint source control programs will be on preventative techniques which are referred to as 'Best Management Practices' in EPA regulations and guidelines. The EPA will provide guidance and technical assistance to the States and local designated agencies. Federal agencies will be encouraged to incorporate 208 objectives into their planning processes and to provide technical assistance to other agencies. Coordinated planning and implementation of nonpoint source programs at all governmental levels should result in significant water quality improvements. (Bell-Cornell)
W77-04017

OPTIMAL SEQUENCING IN INSTALLING WASTEWATER TREATMENT PLANTS,
Consiglio Nazionale delle Ricerche, Milan (Italy). Centro di Teoria dei Sistemi.
For primary bibliographic entry see Field 5D.
W77-04019

PREFERENCE MODELS OF ENVIRONMENTAL IMPACT,
For primary bibliographic entry see Field 6G.
W77-04020

DEMONSTRATION OF A STATE WATER QUALITY MANAGEMENT INFORMATION SYSTEM,
Pennsylvania Dept. of Environmental Resources, Harrisburg. Bureau of Water Quality Management.
Available from GPO Sup Doc as EPI 23/3:600/574-002. $2.05; Microfiche from NTIS as PB-237 282. EPA 600/5-74-022, Socioeconmic Environmental Studies Series, Office of Research and Development, U.S. Environmental Protection Agency, Washington, D.C., August 1974. 129 p, 45 fig, 10 tab.

Descriptors: *Water quality, *Management, *Pennsylvania, *Data collections, costs, Operations, Manpower, Estimating.
Identifiers: *Information systems.

This report is a documentation of the Pennsylvania Water Quality Management Information System (WAMIS). Presented first is a program manager's overview of the system, wherein he discusses the system objectives and development, describes the operations of the various system modules (including required inputs and outputs as well as uses to wich the system may be put), estimates manpower and operating cost requirements, and summarizes methods for system application. Presented next is a compilation of elememts required for system application. Included is detailed documentation of elements required to apply the existing three system modules--the Facility Status, Water Quality, and Contact Modules. Given are system inputs with detailed coding instructions, sample output reports, and documentation of each of three system modules. Module documentation is comprised of system inputs and outputs, system flowcharts, system books, control procedures, clerical procedures, operator's instructions, and all program books. Sufficient information is provided to enable application of WANIS modules by other states or jurisdictions. (Bell-Cornell)
W77-04021

EXPERIMENTAL AND FIELD STUDIES IN HYGIENIC ASSESSMENT OF DRINKING WATER CONTAINING BORON, (IN RUSSIAN),
Institute of General and Municipal Hygiene, Moscow (USSR).
G. V. Verbitskaya.
Gig Sanit 7, p 49-53, 1975.

Descriptors: Public health, *Potable water, Metabolism, *Boron, *Trace elements, Lethal limit, *Water quality standards.

This trace-element had no cumulative properties and affected mainly the functional state of the rabbit parenchymatous organs, the carbohydrate metabolism and certain enzymic systems. The ineffective concentration of boron in water is suggested as a level of 0.5 mg/l.--Copyright 1976, Biological Abstracts, Inc.
W77-04033

NITROGEN AND PHOSPHOROUS REMOVAL FROM LAKES BY FISH HARVEST,
British Columbia Dept. of Recreation and Conservation, Penticton. Fish and Wildlife Branch.
C. J. Bull, and W. C. McKay.
Journal of the Fisheries Research Board of Canada, Vol. 33, p. 1374-1376, 1976, 2 tab., 14 ref.

Descriptors: *Phosphorous, *Nitrogen, *Eutrophication, *Lakes, *Nutrients, *Primary productivity, *Fish harvest, *Water pollution control, *Pollution abatement, Aquatic productivity, Nutrient removal.

Phosphorous (P) made up 0.3-0.5% of the wet weight of four species of fish. Nitrogen (N) accounted for a further 2.4-2.9%. If the maximum annual yield of fish was harvested from the lakes studied, less than 1% of the phosphorous and nitrogen entering the lake would be removed. On the basis of our data fish harvest would apparently not significantly slow nor reverse the process of eutrophication. (Katz)
W77-04035

INVESTIGATIONS ON THE INFLUENCE OF SALT CONCENTRATION ON THE ACTIVITY OF BACTERIAL POPULATIONS FROM FRESH AND WASTE WATERS, (IN GERMAN),
Kiel Univ. (West Germany). Institut fuer Meereskunde.
For primary bibliographic entry see Field 5C.
W77-04065

ROLE OF POPULATIONS OF PLUMATELLA FUNGOSA (PALLAS) (BRYOZOA, PHYLACTOLEMA) IN THE SELF-PURIFICATION OF A POND AND A STREAM, (IN FRENCH),
Liege Univ. (Belgium). Laboratories de Morphologie, de Systematique et d'Ecologie Animales.
P. Job.
Hydrobiologia 48(3), p 257-261, 1976.

Descriptors: *Self purification, Ponds, Organic matter, Streams, Water pollution.
Identifiers: Bryozoa, *Phylactolema, *Plumatella-fungosa.

A very dense population of P. fungosa was observed in a pond and its outlet, polluted by organic matter from sewers. These organisms play a prominent part in the process of water purification; they can absorb annually an average quantity of 113 kg N/ha in zones where the biomass of the colonies reaches 15.6 tons/ha. There is a relation between the evolution of the biological quality of water, classified according to the Kolk-witz-Marsson system, and the localization and density of the Bryozoa populations. The greatest development was observed between the alfa mesosaprobic and beta mesosaprobic zones.--Copyright 1976, Biological Abstracts, Inc.
W77-04083

BACTERIOLOGICAL CHARACTERISTICS OF THE COAST WATERS IN THE DISTRICT OF CATANIA (ITALY), (IN ITALIAN),
Catania Univ. (Italy).
G. Nicoletti, G. Leonardi, and S. Marraro.
Ann Sclavo 17(3), p 283-298, 1975.

Descriptors: Coasts, *Water quality, Swimmi
Europe.
Identifiers: *Bacteriological studi
*Catania(Italy), *Italy.

Water quality on the coast of Catania, Italy satisfactory for sea-bathing.--Copyright 19 Biological Abstracts, Inc.
W77-04084

STUDY ON THE PURIFICATION OF SEWA WATER IN SOILS OF WESTERN SIBERIA, RUSSIAN),
E. M. Lemeshkina, and M. S. Rodionova.
Pochvovedenie 3, p 88-91, 1976.

Descriptors: *Sewage, Biochemistry, Irrigati
*Water purification, Soils, Seasonal, Water t
perature, Water pollution, Waste water treatme
Identifiers: Siberia, *USSR.

The chemical composition of sewage water u for year-round irrigation and the biochem processes occurring during their purification in soil were studied in Western Siberia (USSR). periments with gray forest soil indicated that biochemical processes were affected by the t perature of the water, soil and air, and that th processes were more intensive in the summer t in the fall. A 4 day period between irrigations not ensure the necessary level of water purif tion, while a 5 day interval resulted in water pu cation even when the maximum permissible n of water volume was used.--Copyright 19 Biological Abstracts, Inc.
W77-04090

THE DETECTION OF AEROMONADS OF T HYDROPHILA-PUNCTATA-GROUP, IN T HYGIENIC ANALYSIS OF DRINKING WAT (IN GERMAN),
Frankfurt Univ. (West Germany). Hygiene stitut.
For primary bibliographic entry see Field 5A.
W77-04092

MICROBIOLOGICAL CHARACTERISTICS THE ROS/ RIVER AND SOME OF ITS TRI TARIES, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Insty Hidrobiologii.
For primary bibliographic entry see Field 5C.
W77-04093

BDELOVIBRIO BACTERIOVORUS AS A F TOR OF THE SELF-PURIFICATION OF RIV WATER, (IN RUSSIAN),
Akademiya Nauk SSSR, Pushchino. Inst. Biochemistry and Physiology of Microorganism
N. A. Chuvil'Skaya, L. A. Ledova, L. G. Churkina, and V. A. Lambina.
Gig Sanit 2, p 10-13, 1976.

Descriptors: *Bacteria, *Viru
*Microorganisms, *Water temperature, Water rification, Rivers, *Self purification.
Identifiers: *Bdellovibrio-bacteriovorus, Russ SFSR, *USSR, *Oka River(USSR).

B. bacteriovorus multiplication and bacteriol activities depend on the total number of micro ganisms present and on the water temperature summer at an average river water temperature 23.6C, B. bacteriovorus took an active part in purification of the Oka river (Russian, SF USSR) and caused a significant decrease in number of microorganisms.--Copyright 19 Biological Abstracts, Inc.
W77-04095

ENIC ASPECTS OF PROTECTION OF ER RESOURCES IN THE LIGHT OF THE LUTION BY THE CENTRAL COMMIT- OF THE COMMUNIST PARTY OF THE ET UNION AND THE COUNCIL OF STERS ON 'MEANS OF PREVENTING UTION OF THE VOLGA AND URAL R BASINS BY UNTREATED SEWAGE', USSIAN),
kulov.
nit 2, p 3-7, 1976.

iptors: *Public health, *Water pollution, r quality standards, Water resources, , *Sewage, Reservoirs, Treatment facilities. fiers: Allergy, Carcinogenesis, *USSR, a River, *Ural River.

achievements in hygienic standardization, s of the effects of harmful substances on the (carcinogenesis, allergy) and its reproductive on, and prevention of water reservoir pollu- y industrial sewage are outlined. Animal ction complexes represent a potential niologic threat. Future plans include preven- anitary control of water resources, cor- n of sanitary control zones of water pipes, on of a system to control, supervise and the condition of water reservoirs, and incor- on into urban planning of reservoirs and e plants to allow for urban growth. The tion stipulates complete cessation by 1980 of ing of untreated household and industrial s into the Volga and Ural river basins ian SFSR, USSR).--Copyright 1976, Biologi- stracts, Inc.
04096

PARATIVE INVESTIGATIONS ON THE -PURIFICATION IN POLLUTED WATERS IFFERENT SALINITIES, (IN GERMAN),
Univ. (West Germany). Institut fuer eskunde.
hmutzer, and G. Rheinheimer.
Meeresforsch 31(1), p 17-25, 1975.

riptors: *Self purification, Bacteria, Nitrifi- n, *Sewage, *Salinity.
ifiers: West Germany, *Baltic Sea.

kdown of household sewage in fresh water Baltic sea water was compared to determine ffect of salinity. This process at the beginning slower in Baltic Sea water than in fresh r. After 3-4 days a slackening occurs, mainly a lown of nitrification, possibly caused by the er decline of sewage and fresh water bacteria ackish water. The bactericidal effect is insig- nt at the beginning due to the high nutrient entration, and becomes noticeable only after days with the decrease in nutrients. During itial phase the salinity of the Baltic Sea water itro seems to enhance the breakdown sses; perhaps the higher osmotic value plays . At the sewage outlet from the city of Kiel at (W Germany), the power of self-purification e brackish water is sufficiently great to allow ation of coastal waters as a drainage outlet r than nearby inland waters.--Copyright 1976, gical Abstracts, Inc.
04098

VATER RESOURCES LANNING

Techniques Of Planning

ABLISHMENT OF OPERATIONAL DELINES FOR TEXAS COASTAL ZONE AGEMENT. SPECIAL REPORT I: WATER LITY MODELLING AND MANAGEMENT DIES FOR CORPUS CHRISTI BAY: A GE SYSTEM APPROACH,
s Univ., at Austin. Center for Research in r Resources.

For primary bibliographic entry see Field 5B.
W77-03898

ECONOMIC MODELING FOR WATER POLICY EVALUATION.
North-Holland/TIMS Studies in the Management Sciences, Volume 3, North-Holland/American Elsevier, New York, N.Y., 1976. 261 p, 32 fig, 19 tab, 234 ref. R. M. Thrall, et al., Eds.

Descriptors: *Water resources development, *Water policy, *Economics, *Mathematical models, *Optimization, Water quality control, Evaluation, Analytical techniques, Linear programming, Dynamic programming, Simulation analysis, Management, Decision making, Planning, Projects, Social aspects, Industries, Agriculture, River basins, Environment, Systems analysis.
Identifiers: Cost minimization.

Presented is a set of papers selected from a series of four sessions on Economic Modeling for Water Policy Evaluation at the 1974 TIMS/ORSA meeting in San Juan Puerto Rico. The emphasis throughout is upon model development and utilization and a variety of water resources development problems are addressed. The first two papers provide a historical background of water resources modeling and a review of the current status of modeling efforts; unsolved problems are elucidated. The following three papers are devoted to water-related models applied to industry and agriculture. Next, seven papers contribute to the field of modeling methodology, with reference to some use of water. Considered are: time phasing and scale in water projects, accounting for the importance of their physical setting; marketing of effluent emission rights by river basin authorities as a regulatory mechanism; incorporation of recreational factors into water management models; the pulp and paper industry as a basis for comparing the merits of linear and mixed integer programming models; approaches to resource management which embody interactions between modeler and decision maker; and the problem of pricing the commons, examined in the context of a common aquifer or surface water supply, or fishing ground. These articles are then followed by eight very brief papers in the nature of editorial comments, coming from a panel discussion on forward-looking views on water use. Among the topics considered is present shortcomings of systems analysis as applied to water resources planning and management. (See W77-03925 and W77-03936) (Bell-Cornell)
W77-03924

WATER RESOURCE MODELS: A HISTORICAL SUMMARY,
New Mexico Univ., Albuquerque.
N. Wollman.
In: Economic Modeling for Water Policy Evaluation (Ed. by Robert M. Thrall, et al.) North-Holland/TIMS Studies in the Management Sciences, Vol. 3, North-Holland/American Elsevier, New York, N.Y., 1976, p 1-20. 32 ref.

Descriptors: Water resources, *Mathematical models, *History, *Economics, Water quality, Water supply, Water treatment, Comprehensive planning, Environment, Water policy, Optimization, Simulation analysis, Systems analysis.
Identifiers: Cost minimization, Benefit maximization.

This review of water resource models pays special attention to national and regional models and covers the quarter century beginning with the report of the President's Water Resources Policy Commission of 1950. The summary includes work of the Senate Select Committee on National Water Resources, the National Water Commission, the North Atlantic Regional Water Resources Study Coordinating Committee, and selected contributions of academic, governmental, and research organizations to simulation and optimization models. Discussed are the University of Colorado economic model and Resources For the Future's Delaware Estuary model. Growth in complexity of models is apparent as well as movement toward multi-objective, multi-regional, and multi-media equilibrium solutions. Efforts are underway to identify optimum combinations of production processes, treatment of residuals, quality of environment, and mix of goods and services. Impressive progress has been achieved in developing new tools and in generating new data. However, we still lack capability of reaching optimal or general equilibrium solutions even under static conditions, with even less capability for satisfactory solution of transitional sequences and tracing of macroeconomic effects. (See also W77-03924) (Bell-Cornell)
W77-03925

MODELING AND INFORMATION HANDLING IN ENVIRONMENTAL SCIENCE,
American Univ., Washington, D. C. Coll. of Public Affairs.
For primary bibliographic entry see Field 5G.
W77-03926

MODELS OF AGRICULTURAL WATER, LAND USE AND THE ENVIRONMENT,
Iowa State Univ., Ames.
E. O. Heady, and K. J. Nicol.
In: Economic Modeling for Water Policy Evaluation (Ed. by Robert M. Thrall, et al.) North-Holland/TIMS Studies in the Management Sciences, Vol. 3, North-Holland/American Elsevier, New York, N.Y., 1976, p 29-56. 10 fig, 4 tab, 6 ref. 1 append.

Descriptors: *Water resources development, *Water allocation(Policy), *Agriculture, *Water demand, *Linear programming, *Model studies, *Land use, Environment, Regions, Irrigation, Optimization, Economics, Water supply constraints, Alternative planning, Evaluation, Systems analysis.
Identifiers: *Cost minimization, *Food production, *Soil loss, Interregional, Water use coefficients.

This article considers a series of large-scale models relating to water allocation, land use, interregional allocation of food production, and environmental quality restraints and agricultural policy. These comprehensive, linear programming models are still in the development stage and are utilized to determine least cost agricultural production alternatives. Two of these models, developed to analyze water allocation and demand in interaction with parallel variables for land, are summarized in detail. These analyses are made in relation to parameters of varying magnitude for population, export and domestic food demand, technological inputs, environmental restraints, agricultural supply control policies, and exogenous urban industrial uses. The first model discussed emphasizes water; the second model is an extension of the first to include soil loss, a variable of major environmental consequences in the agricultural sector. Results indicate that increases in water price have a more important effect on water use in the 17 Western States than does change in numerous other parameters. The National soil loss total and average loss per acre by land resource groups for five alternatives of soil loss restriction are given. (See also W77-03924) (Bell-Cornell)
W77-03927

NATIONAL ECONOMIC MODELS OF INDUSTRIAL WATER USE AND WASTE TREATMENT,
Houston Univ., Tex.
For primary bibliographic entry see Field 5D.
W77-03928

GROUND WATER MANAGEMENT AND SURFACE WATER DEVELOPMENT FOR IRRIGATION,
Montana State Univ., Bozeman.
For primary bibliographic entry see Field 4B.
W77-03929

COORDINATING SCALE AND SEQUENCING DECISIONS FOR WATER RESOURCES PROJECTS,
California Univ., Los Angeles.
D. Erlenkotter.
In: Economic Modeling for Water Policy Evaluation (Ed. by Robert M. Thrall, et al.) North-Holland/TIMS Studies in the Management Sciences, Vol. 3, North-Holland American Elsevier, New York, N.Y., 1976, p 97-112. 1 fig, 3 tab, 27 ref.

Descriptors: *Water resources development, *Projects, *Timing, *Planning, *Dynamic programming, Coordination, Decision making, River basins, Analytical techniques, Costs, Benefits, Optimization, Mathematical models, Systems analysis.
Identifiers: *Sequencing, Cost minimization, *Project scale.

The development of water resources leads to decisions involving the selection, scale, and time-phasing of various water projects. Water resources projects tend to be uniquely characterized by their physical setting and once developed, changes in project scale are difficult or impossible. Thus both the scale and sequence in which water projects are undertaken are of great importance. Scale is often determined in a static context, while sequencing is examined under the presumption that the sizes of individual projects are already specified. After tracing briefly the evolution of approaches for planning development of water resources, the close interrelationship between scale and sequencing decisions for water resources projects is demonstrated using simple modeling techniques. Employed is dynamic programming to minimize the costs of project operations. The modeling shows the complexity of determining water resources development decisions in a more general framework; economies of scale for individual projects lead to intractable nonconvex programming problems even if sequencing is given, while the sequencing decision itself is a difficult combinatorial problem. (See also W77-03924) (Bell-Cornell)
W77-03930

WATER QUALITY MANAGEMENT AND THE DISTRIBUTION OF EMISSION RIGHTS BY SEALED TENDER MARKETS,
Geological Survey, Washington, D. C.
For primary bibliographic entry see Field 5G.
W77-03931

INCORPORATING OUTDOOR RECREATION IN A MODEL OF STREAM FLOW REGULATION AND WATER QUALITY IMPROVEMENT,
Technion-Israel Inst. of Tech., Haifa.
For primary bibliographic entry see Field 5G.
W77-03932

MODELING PROCESS SUBSTITUTIONS BY LP AND MIP,
Resources for the Future, Inc., Washington, D. C.
For primary bibliographic entry see Field 5G.
W77-03933

TWO METHODS FOR ADDING INFORMATION TO THE RESOURCES MANAGEMENT PROCESS,
Office of Water Research and Technology, Washington, D. C.
For primary bibliographic entry see Field 6B.
W77-03935

QUASI-PUBLIC GOODS: PRICING THE COMMONS,
Ohio State Univ., Columbus.
R. A. Tybout.
In: Economic Modeling for Water Policy Evaluation (Ed. by Robert M. Thrall, et al.) North-Holland/TIMS Studies in the Management Sciences, Vol. 3, North-Holland/American Elsevier, New York, N.Y., 1976, p 211-236. 1 fig, 10 ref.

Descriptors: *Water resources, *Natural resources, *Pricing, *Economic efficiency, Pollution abatement, Fisheries, Graphical analysis, Analytical techniques, Marginal costs, Optimization, Transportation, Recreation, Industries, Constraints, Standards, Mathematical models, Systems analysis.
Identifiers: The commons, *Congestion, *Quasi-public goods, Externalities, Household sector, Lagrangean maximization

The problem of the commons appears in many forms, such as exploitation of a common aquifer. Congestion is a problem of the commons, and this fact plays an important role in the analysis presented herein. Congestion in the use of natural areas or man-made facilities can interfere with economic optimization. This paper proposes a general framwork for efficient pricing of the commons and considers the cases of natural resources and congestion. Externalities in the allocation of space are the cause of congestion just as externalities in the exploitation of natural resources are the cause of conventional commons problems. The proposed framwork is shown to be consistent with some contributions extant in received theory but in conflict with others. The concept of quasi-public goods is introduced to distingish the unifying characteristic of the commons from other pricing problems. The three classes of goods -- private, public and quasi-public -- are found to be qualitatively distinct. A final analysis deals with the externalities of pollution. It is shown that there are no quasi-public goods in the case of pollution, only public and private goods. A fish harvesting modes is used to illustrate the case of resource exploitation. Derived is a social optimum for the collective; Lagrangean maximization is used to find the marginal conditions of welfare maximization for the collective.. In the case of congestion, examples are considered in transportation and recreation. The pollution case deals with interindustry effects, the household sector, and standards. (See also W77-03924) (Bell-Cornell)
W77-03936

MULTILEVEL INCREMENTAL DYNAMIC PROGRAMING,
New South Wales Univ., Kensington (Australia). School of Civil Engineering.
P. Nopmongcol, and A. J. Askew.
Water Resources Research, Vol. 12, No. 6, p 1291-1297, December 1976. 7 fig, 1 tab, 10 ref.

Descriptors: *Water resources, *Dynamic programming, *Optimization, Computer models, Methodology, Reservoirs, Equations, Systems analysis.

An approach to the solution of multidimensional dynamic programs is presented which differs from most decomposition methods currently used in optimization of water resources systems. The basic concept is directly dependent upon certain characteristics of incremental dynamic programming (IDP). The new technique presented herein is called multilevel incremental dynamic programming (MIDP). It provides a marked reduction in computer time and permits high-dimensional deterministic pmiroblems to be handled with far greater ease than has been previously possible. The technique take advantage of certain characteristics of invertible systems, but may be easily extended to noninvertible systems. The MIDP method increases the power of IDP as a tool in the optimization of multidimensional deterministic systems. An example of application of MIDP to a hypothetical 4-reservoir system is studied. (Cornell)
W77-03937

OPTIMAL LONG-TERM CONTROL OF A M TIPURPOSE RESERVOIR WITH INDIR USERS,
Institut za Vodoprivredu Jaroslav Cerni, Bel (Yugoslavia).
S. Opricovic, and B. Djordjevic.
Water Resource Research, Vol. 12, No. 6, p 1 1290, December 1976. 3 fig, 9 ref.

Descriptors: *Multiple-purpose reserv *Control, *Dynamic programming, *W storage, *Water allocation(Policy), *Algorit Optimization, Water distribution(Applied), In tion, Water shortage, Efficiencies, Equat Mathematical models, Operations research
Identifiers: *Vardar basin(Yugoslavia), W users.

A dynamic programming, three-level algor has been developed in order to solve ce problems in the practical design of multipur reservoirs in the Vardar basin in Yugoslavia, basin in an area of water deficit, and a big ri water comsumption in both the Yugoslav Greek portions of the reservoir is envisage the future. Described is the algorithm used fo optimal control of a multipurpose reservoir direct and indirect users. (Indirect users, su irrigators, are those who reuse water after direct user, e.g., hydroelectric plants). The level optimizes the distribution of available among time intervals; the second level allo water to direct users in one time interval. A third level, water already used by direct users located to indirect users further downstr Dynamic programming is employed at all levels, but the recurrence relations are dt evel in accordance with the decomposition of the trol problem. Optimization criteria, and re are most efficient water storages and allocati water to all users, and consideration of e production over a 20-year period. Statistical a sis of the results yields a graph of the proba of optimal water levels in a reservoir during a which represents the optimum long-term co policy. (Bell-Cornell)
W77-03938

RELIABILITY, TRADE-OFFS, AND WA RESOURCES DEVELOPMENT MODEL WITH MULTIPLE CROPS,
New South Wales Univ., Kensington (Austr School of Economics.
N. J. Dudley, D. M. Reklis, and O. R. Burt.
Water Resources Research, Vol. 12, No. 6, p 1108, December 1976. 5 fig, 1 tab, 11 ref.

Descriptors: *Irrigation efficiency, *W resources development, *Water ma ment(Applied), *Planning, *Optimiza *Economic efficiency, *Decision ma *Reliability, Downstream, Crops, Water su Benefits, Summer, Inflow, Water utiliza Linear programming, Dynamic programm Simulation analysis, Reservoir storage, Rese releases, Water allocation(Policy), Mon Design, Estimating, Equations, Mathema models, Computer models, Systems analysis.
Identifiers: *Benefit maximization, H latitudes.

A hierarchy of models, structured to maximiz pected benefits, is developed to aid mange and planning decisions in multicrop resources systems located in higher latitude the world and featuring significant downst requirements. A major objective is to qua tradeoffs between systems with a high relia of water supply but low average benefits and of low reliability with high average but also h variable returns. Linear programming is use select the best crop combinations for given qu

s of water available over the summer, as-
ciated water usage, and revenue estimates. A
nulation model predicts changes in reservoir
rage resulting from inflows and releases to meet
uirements of crops selected by the linear pro-
m. Interseasonal water allocation is then op-
ized by using dynamic programming. A method
presented for determining variance of benefits
a function of system design parameters and
wnstream requirements. In an application to a
ter resources system in Montana, downstream
ter requirements and penalties were found to
ve a large effect on high reliability-low reliabili-
tradeoffs. With zero downstream water require-
nts, there was not tradeoff between expected
nefits and variance of benefits as acreage
veloped for irrigation increased. (Bell-Cornell)
77-03939

ODEL UNCERTAINTY IN FLOOD FREQUEN-
ANALYSIS AND FREQUENCY-BASED
SIGN,
aterloo Univ. (Ontario). Dept. of Civil Engineer-
r primary bibliographic entry see Field 4A.
77-03940

PTIMIZATION OF CROP IRRIGATION
RATEGY UNDER A STOCHASTIC
EATHER REGIME: A SIMULATION STUDY,
xas A and M Univ., College Station. Dept. of
il and Crop Sciences.
r primary bibliographic entry see Field 3F.
77-03941

SELECTED ANNOTATED BIBLIOGRAPHY
N THE ANALYSIS OF WATER RESOURCE
STEMS, SEVENTH VOLUME.
ffice of Water Research and Technology,
ashington, D. C.
vailable from the National Technical Informa-
n Service, Springfield, VA 22161 as PB-263 191,
ice codes: A17 in paper copy, A01 in microfiche.
ater Resources Scientific Information Center,
eport OWRT/WRSIC 76-201, November 1976,
0 p. Edited by Daniel P. Loucks

escriptors: *Water resources development,
ibliographies, *Computer models, Cost analy-
, Economics, *Linear programming, Manage-
nt, *Mathematical models, Model studies,
ptimization, Planning, Reservoir operation,
nulation analysis, Stochastic processes,
ystems analysis, Water quality, Water supply.

is is an annotated bibliography of 248 selected
blications issued in 1974 and 1975 pertaining to
e application of systems analysis techniques for
fining and evaluating alternative solutions to
ter resource problems. The first two volumes of
s bibliography, having the same title, were
blished by the Cornell University Water
sources and Marine Sciences Center, Ithaca,
w York (Publication 25, August 1969; Publica-
n 35, June 1971); the third, fourth, fifth, and
th volumes were published by the Water
sources Scientific Information Center in
cember 1972, December 1973, July 1974, and
ptember 1975, respectively. Both subject and
thor indexes are provided. Descriptors are listed
th each abstract. The abstracted material
phasizes the application of optimization and
nulation techniques for assisting in the planning
d management of water resource systems. (See
o W76-01517; W74-11574; W74-05401; W73-
428; W71-09465 and W70-00506)
77-03967

EAST COST CONTROL STRATEGIES IN
RBAN DRAINAGE DESIGN -- A DYNAMIC
OGRAMMING APPROACH,
ashington Univ., Seattle. Dept. of Civil En-
neering.
r primary bibliographic entry see Field 4A.
77-04007

APPLIED MATHEMATICAL MODELLING IN MARINE SCIENCE,
Liege Univ. (Belgium). Institut de Mathematique.
For primary bibliographic entry see Field 2L.
W77-04008

APPLICATION OF GAME THEORY IN WATER MANAGEMENT,
Water Resources Center, Budapest (Hungary).
I. Bogardi, and F. Szidarovszky.
Applied Mathematical Modelling, Vol. 1, No. 1, p 16-20, June 1976. 1 fig, 1 tab, 23 ref.

Descriptors: *Water management(Applied), *Water resources, *Decision making, *Water quality control, Optimization, Environmental control, Economics, Irrigation systems, Regional development, Costs, Benefits, Algorithms, Equations, Mathematical models, Systems analysis.
Identifiers: *Game theory, *Oligopol game.

To date, game theoretical principles have been used where other programming methods have failed in the design of complex water management systems. In this sense, the optimum strategy for water resources development in an international river basin can be determined by using game theory with due allowance to the various technical, economic and social conditions of the countries involved. Under such complex conditions, game theory primarily promotes the formulation of the problem and the practical solution simplifies the method to a linear programming algorithm. A general evaluation of work concerning applied game theory in water quality management shows that, though a number of workers have realized the potentialities of game theory for decision analysis, methods for its broad applicability are still lacking. This paper focuses on practical applications and introduces possible uses of the oligopol game in water management. Important areas of water management are shown where the form of typical goal functions permits the use of methods elaborated for oligopol games. A detailed application of the method to regional water quality management is presented where the objective is to determine least cost and greatest benefit alternatives. (Bell-Cornell)
W77-04009

PHYSICAL AND ECONOMIC PARAMETERS FOR PLANNING REGIONAL WASTEWATER TREATMENT SYSTEMS,
North Dakota State Univ., Fargo. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W77-04010

DETERMINING WATERSHED SUB-AREAS WITH PRINCIPAL COMPONENT ANALYSIS,
Tobacco Tax Council, Richmond, Va.
For primary bibliographic entry see Field 4D.
W77-04012

OPTIMAL SEQUENCING IN INSTALLING WASTEWATER TREATMENT PLANTS,
Consiglio Nazionale delle Ricerche, Milan (Italy). Centro di Teoria dei Sistemi.
For primary bibliographic entry see Field 5D.
W77-04019

PREFERENCE MODELS OF ENVIRONMENTAL IMPACT,
For primary bibliographic entry see Field 6G.
W77-04020

6B. Evaluation Process

THE CALIFORNIA COASTAL PLAN (A SYMPOSIUM).
For primary bibliographic entry see Field 6E.
W77-03688

COASTAL ZONE MANAGEMENT IN FLORIDA,
Florida Univ., Gainesville. School of Law.
For primary bibliographic entry see Field 6E.
W77-03699

THE PROJECTED ECONOMIC IMPACT OF THE RICHARD B. RUSSELL DAM AND LAKE UPON SOUTH CAROLINA,
Clemson Univ., S. C. Dept. of Agricultural Economics and Rural Sociology.
J. M. Stepp, J. B. London, and P. C. Luisa.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 014, Price codes: A05 in paper copy, A01 in microfiche. South Carolina Water Resources Research Institute, Clemson, Report Number 60, February 1976. 93 p, 2 fig, 6 tab, 28 ref. S-000-SC.

Descriptors: *Water resources development, *Economic impact, Cost-benefit analysis, *Regional analysis, *South Carolina, Lakes, Dams, *Pre-impoundment, *Environmental effects, *Projections, Benefits, *Project benefits, Project planning.
Identifiers: *Savannah River(SC), Richard B. Russell Dam(SC).

This report is based upon a reconnaisance (rather than in-depth) study of the projected economic and environmental effects upon South Carolina of a proposed U. S. Army Corps of Engineers project on the Savannah River, which constitutes the boundary between Georgia and South Carolina. Beneficial and adverse effects of the project upon South Carolina are identified, described and, where possible, quantified. The purpose was to provide, as requested, information and recommendations for the use of South Carolina public officials and private organizations in deciding whether to support, oppose, and/or seek modifications of the project. The quantifiable annual benefits to South Carolinians from the project as currently designed were estimated to be 1.75 times as high as the quantifiable costs to South Carolinians, but it was concluded that a very large proportion of the net benefits would be cancelled by unquantified adverse environmental effects. Several suggestions are made for project changes which would increase the benefits and reduce the adverse effects.
W77-03735

ASSESSMENT OF FLOOD MANAGEMENT ALTERNATIVES AGAINST SOCIAL PERFORMANCE CRITERIA, PHASE II REPORT,
Institute of Public Administration, New York.
For primary bibliographic entry see Field 6F.
W77-03774

WATER PROBLEMS IN THE COLORADO RIVER BASIN: LEGAL AND INSTITUTIONAL FRAMEWORK,
Economic Research Service, Washington, D.C.
For primary bibliographic entry see Field 5G.
W77-03830

WATER AVAILABILITY, QUALITY, AND USE IN ALASKA.
Geological Survey, Anchorage, Alaska.
G. O. Balding.
Open-file report 76-513, August 1976. 236 p, 86 fig, 42 tab, 147 ref.

Descriptors: *Available water, *Surface waters, *Groundwater resources, *Water quality, *Alaska, Streamflow, Flow rates, Flood discharge, Flood frequency, Water wells, Water yield, Hydrologic data, Chemical analysis, Water utilization.

The Alaska Water Assessment, sponsored by the Water Resources Council, is a specific problem analysis for Alaska of the National Assessment of

Water and Related Land Resources. The Alaska region has been divided into six hydrologic subregions and eighteen subareas. For each subarea, estimated mean annual runoff per square mile, suspended-sediment concentrations that can be expected during 'normal' summer runoff, flood magnitudes and frequencies, and ground-water yields are illustrated on maps. Tables show water quality of both ground water and surface water from selected wells and streams. Water use according to the type of use is discussed, and estimates are given for the amounts used. Water-use categories include domestic, irrigation, livestock, seafood processing, oil and gas development, petrochemical processing, pulp mills, hydroelectric, coal processing, steam electric, mineral processing, sand and gravel mining, and fish-hatchery operations. (Woodard-USGS)
W77-03883

ECONOMIC MODELING FOR WATER POLICY EVALUATION.
For primary bibliographic entry see Field 6A.
W77-03924

WATER RESOURCE MODELS: A HISTORICAL SUMMARY,
New Mexico Univ., Albuquerque.
For primary bibliographic entry see Field 6A.
W77-03925

COORDINATING SCALE AND SEQUENCING DECISIONS FOR WATER RESOURCES PROJECTS,
California Univ., Los Angeles.
For primary bibliographic entry see Field 6A.
W77-03930

WATER QUALITY MANAGEMENT AND THE DISTRIBUTION OF EMISSION RIGHTS BY SEALED TENDER MARKETS,
Geological Survey, Washington, D. C.
For primary bibliographic entry see Field 5G.
W77-03931

INSTITUTIONS AND OBJECTIVES ON THE WATER, ENERGY, ENVIRONMENT INTERFACE,
Harvard Univ., Cambridge, Mass.
M. Roberts.
In: Economic Modeling for Water Policy Evaluation (Ed. by Robert M. Thrall, et al.) North-Holland/TIMS Studies in the Management Sciences, Vol. 3, North-Holland/American Elsevier, New York, N.Y., p 179-196, 1976. 50 ref.

Descriptors: *Water resources, *Decision making, *Quality control, *Economic aspects, *Social aspects, Environment, Energy, Water policy, Legislation, Cost-benefit analysis, Optimization, River basins, Planning, Dams, Recreation.

Without some agreement about what is to be studied, and how that is to be done, no discipline can make much scientific progress. Occasionally, someone must ask philosophically, 'What is the question.' In particular, what do the physical relationships among energy production, environmental quality and water use imply for how we should define such policy questions both institutionally and philosophically. In other words, do we want water agencies, energy agencies, or something else. And, how should we specify our objective function for policy purposes. Conventional answers are not fully satisfactory, since real systems are so complex; rather, the question is what kind of imperfection is most helpful in each particular context. From this perspective, the author criticizes the recently fashionable suggestion that we use residuals management as a basis for institutional arrangements. Characterized as non-operational and ethically unappealing are most economists' favorite formulation of social choice problems. Given is a suggestion for dealing with the problem of the social rate of discount. It is concluded that the continued growth of the energy sector will place steadily increasing demands on water resources, and so we therefore need more thought on how to define important policy questions. Problems of optimum river basin development are considered as examples. (See also W77-03924)(Bell-Corell)
W77-03934

TWO METHODS FOR ADDING INFORMATION TO THE RESOURCES MANAGEMENT PROCESS,
Office of Water Research and Technology, Washington, D. C.
T. G. Roefs.
In: Economic Modeling for Water Policy Evaluation (Ed. by Robert M. Thrall, et al.) North-Holland/TIMS Studies in the Management Sciences, Vol. 3, North-Holland/American Elsevier, New York, N.Y. p 197-210, 1976. 1 fig, 22 ref.

Descriptors: *Water resources, *Management, *Decision making, *Planning, *Methodology, *Social aspects, Estimating, Simulation analysis, Computer programs, Optimization, Linear programming, Systems analysis.
Identifiers: *Information system, *Multi-objective planning, *Social goals, Conflict resolution.

Two new approaches to the resource decision and management process are outlined. The first is an application of Management Information System concepts to information generated by the Planning process. A recursive access system based on national goals is employed. The system is essentially static in that alternative scenarios and problem solutions are predetermined. This process system, created by the thirteen western states, has had a trial application to river basin planning. The second approach is one which works toward a conflict resolution process: the process involvesfast access to simulation routines to estimate effects of decisions within a narrowly defined decision space. It shows more flexibility than the first approach but requires a more intense problem focus and greater information resources. (See also W77-03924) (Bell-Cornell)
W77-03935

MULTIPURPOSE DEVELOPMENT ON THE TISZA RIVER.
For primary bibliographic entry see Field 4A.
W77-03957

POLLUTION, WELFARE, AND ENVIRONMENTAL POLICY IN THE THEORY OF COMPARATIVE ADVANTAGE,
Northwestern Univ., Evanston, Ill. Center for Mathematical Studies in Economics and Management Science.
For primary bibliographic entry see Field 6G.
W77-03958

PUBLIC CHOICE AND URBAN WATER QUALITY,
Georgia Univ., Athens.
C. D. DeLorme, and N. J. Wood.
American Journal of Economics and Sociology, Vol. 35, No. 3, p. 225-233, 1976. 1 tab., 10 ref.

Descriptors: *Waste water treatment, *Comparative benefits, *Comparative costs, Economic efficiency, Resource allocation, Cities, Effluents, Federal Water Pollution Control Act, Estuaries, Biochemical oxygen demand.
Identifiers: *Zero discharge alternatives.

A goal of 90% biochemical oxygen demanding waste removal from effluents is explored as an alternative to the Federal Water Pollution Control Act goal of zero discharge for metropolitan areas located on large bodies of water. Based on a study of water quality in five Delaware estuaries, it concluded that there is no significant improveme in water use or in water quality from increasing t waste removal level from 90 to 100% while mee ing the higher standard would entail a significa marginal cost. The cost of providing seconda sewage treatment at 90% removal of oxygen d manding wastes from effluents discharged in these estuaries is estimated to be $.04 per poun while removal of the last 10% of the waste wou cost at least $2.00 per pound. A total of $317 m lion per year would be required to move from 90 100% removal in these estuaries, and a total nearly $1 billion per year might be required to a commodate all similar urban areas in the U.S. N only is the 100% removal cost high, but that a proach fails to take advantage of the natural wa assimilative capabilities of large bodies of water. 90% removal approach would not only economically more efficient, but would lea scarce resources available for other social goo (Luedtke-Wisconsin)
W77-03960

ESTIMATING NET BENEFITS OF RECRE TION UNDER CONDITIONS OF EXCESS D MAND,
Rhode Island Univ., Kingston. Dept. of Resour Economics.
For primary bibliographic entry see Field 6D.
W77-03964

APPLICATION OF GAME THEORY IN WATI MANAGEMENT,
Water Resources Center, Budapest (Hungary).
For primary bibliographic entry see Field 6A.
W77-04009

PHYSICAL AND ECONOMIC PARAMETE FOR PLANNING REGIONAL WASTEWATI TREATMENT SYSTEMS,
North Dakota State Univ., Fargo. Dept. of Ci Engineering.
For primary bibliographic entry see Field 5D.
W77-04010

A SCIENTIFIC BASIS FOR DETERMININ RECREATIONAL WATER QUALI CRITERIA,
Lockheed Missiles and Space Inc., Sunnyva Calif.
For primary bibliographic entry see Field 5G.
W77-04011

DETERMINING WATERSHED SUB-ARE WITH PRINCIPAL COMPONENT ANALYSIS,
Tobacco Tax Council, Richmond, Va.
For primary bibliographic entry see Field 4D.
W77-04012

SOCIAL WELL-BEING AND WATI RESOURCES PLANNING,
Office of Water Research and Technolo Washington, D.C.
L. R. Brown.
Water Resources Bulletin, Vol. 12, No. 6, p 11 1190, December 1976. 3 fig, 9 ref.

Descriptors: *Water resources developme *Planning, *Social aspects, Cost-benefit analys Economics, Evaluation, Aesthetics.
Identifiers: *Social impact analysis, *Social we being, Multi-objective planning.

For many years, Federal water resources proje have been subjected to benefit-cost analysis establish their economic feasibility. Several ye ago, social well-being was added as a conside tion, and since then it has come to the forefron water resources development planning. This pa discusses the state-of-the-art in analyzing a evaluating aspects of social well-being. It strea

tcomings and advocates a direction for further
ts. Considered are the goal structure of
omic opportunity and that of aesthetic oppor-
y. Given is a hypothetical social profile, in-
ng such topics as education, welfare, health,
aw and justice. It is concluded that social in-
ors must be streamlined down to more
geable proportions. (Bell-Cornell)
-04013

IONSTRATION OF A STATE WATER
LITY MANAGEMENT INFORMATION
TEM,
sylvania Dept. of Environmental Resources,
isburg. Bureau of Water Quality Manage-
.
rimary bibliographic entry see Field 5G.
-04021

Cost Allocation, Cost Sharing, ricing/Repayment

RVEY OF PULP AND PAPER INDUSTRY
IRONMENTAL PROTECTION EXPENDI-
ES AND OPERATING COSTS - 1975,
nal Council of the Paper Industry for Air and
m Improvement, Inc., New York.
rimary bibliographic entry see Field 5D.
-03807

OTE ON EFFLUENT CHARGES AND MAR-
STRUCTURE,
Univ. of New York at Binghamton.
omic Growth Inst.
rimary bibliographic entry see Field 5G.
-03955

LUENT CHARGES AND LICENSES UNDER
ERTAINTY,
ard Univ., Cambridge, Mass. Dept. of
omics.
rimary bibliographic entry see Field 5G.
-03959

MINATION OF ENVIRONMENTAL POLLI-
USING PRODUCTION AND POLLUTION
ROPARAMETER DISTRIBUTIONS,
Aviv Univ. (Israel). Foerder Inst. for
omic Research.
rimary bibliographic entry see Field 6G.
-03961

SYMMETRY OF EFFLUENT CHARGES
SUBSIDIES FOR POLLUTION CONTROL,
nto Univ. (Ontario). Inst. for Environmental
es and Engineering.
rimary bibliographic entry see Field 5G.
-03962

HNICAL AND MICROECONOMIC ANALY-
OF CADMIUM AND ITS COMPOUNDS,
ar, Inc., Springfield, Va.
rimary bibliographic entry see Field 5B.
-03963

IMUM EFFORT AND RENT DISTRIBU-
IN THE GULF OF MEXICO SHRIMP
ERY,
s A and M Univ., College Station.
Griffin, R. D. Lacewell, and J. P. Nichols.
rican Journal of Agricultural Economics, Vol.
o. 4, Part I, p 644-652, November 1976. 1 fig,
21 ref.

riptors: *Fisheries, *Shrimp, *Gulf of Mex-
*Rent, Distribution, Optimization, Costs,
gement, Methodology, Ships, Mathematical
ls, Systems analysis, Equations.
ifiers: *Rent maximization, Common proper-
pportunity costs, *Economic optimum.

Traditional methods used to estimate fishing effort that maximizes rent to an open access resource have almost universally assumed all costs are directly proportional to effort. When crews receive a fixed share of gross returns, labor costs are proportional to catch; hence, rent acrues to crews as well as vessel owners under limited entry. A model that allows costs to be proportional to effort and catch has been applied to the Gulf of Mexico shrimp fishery. This study indicates that traditional analysis would result in management schemes that overtax vessels and ignore rent accruing to crews. Management schemes must be dynamic if they are going to be effective, since optimum effort rent to the resource is very sensitive to price changes. (Bell-Cornell)
W77-04014

THE INTEGRATION OF DESALINATION PLANT WITH EXISTING AUSTRALIAN WATER RESOURCES,
New South Wales Univ., Kensington (Australia). School of Nuclear Engineering.
For primary bibliographic entry see Field 3A.
W77-04018

6D. Water Demand

WATER RESOURCES OF EL PASO COUNTY, COLORADO,
Geological Survey, Lakewood, Colo. Water Resources Div.
R. K. Livingston, J. M. Klein, and D. L. Bingham.
Colorado Water Conservation Board, Denver, Colorado Water Resources Circular No 32, 1976. 85 p, 53 fig, 4 tab, 7 append.

Descriptors: *Water resources, *Surface waters, *Groundwater resources, *Water demand, *Urbanization, Hydrologic data, Water quality, Gaging stations, Flow rates, Aquifer characteristics, Surface-groundwater relationships, Available water, Water utilization, Imported water, Projections, *Colorado.
Identifiers: El Paso County(Colo), Human population growth.

The rate of population growth in El Paso County, Colo., has been one of the fastest in the United States. Continued rapid population growth has been accompanied by a similar growth in demand for industrial and municipal water. The largest municipality in the county, Colorado Springs, imports more than one-half of its water from sources outside the county. Estimated water budgets for four drainage indicate that precipitation and evapotranspiration account for 82 to 100 percent of the water entering and leaving each basin. The county is drained by tributaries of both the South Platte and Arkansas Rivers--the Arkansas River basin draining about 95 percent of the county. The dissolved-solids concentration of water in the streams of the county is inversely related to streamflow. The addition of sewage effluent deteriorates the water quality of Fountain Creek. The principal alluvial aquifers are in Fountain Creek and Jimmy Camp Creek valleys, which contain an estimated 100,000 acre-feet of water in storage, and in the upper Black Squirrel Creek basin, which contains an estimated 350,000 acre-feet of water in storage. The dissolved-solids concentration of water from the alluvial aquifers range from about 250 to 3,690 mg/liter. The principal bedrock aquifer, the Dawson Formation contains an estimated 38 million acre-feet of water in the upper 500 feet of saturated thickness. In most areas the dissolved-solids concentration of ground water from the Dawson Formation is less than 500 mg/liter. The present water supply in El Paso County can be augmented primarily by future increased water imports from outside of the county and reuse of that water, and by increased use of ground water. (Woodard-USGS)
W77-03890

MODELS OF AGRICULTURAL WATER, LAND USE AND THE ENVIRONMENT,
Iowa State Univ., Ames.
For primary bibliographic entry see Field 6A.
W77-03927

INCORPORATING OUTDOOR RECREATION IN A MODEL OF STREAM FLOW REGULATION AND WATER QUALITY IMPROVEMENT,
Technion-Israel Inst. of Tech., Haifa.
For primary bibliographic entry see Field 5G.
W77-03932

ESTIMATING NET BENEFITS OF RECREATION UNDER CONDITIONS OF EXCESS DEMAND,
Rhode Island Univ., Kingston. Dept. of Resource Economics.
K. E. McConnell, and V. A. Duff.
Journal of Environmental Economics and Management, Vol. 2, No. 3, p. 224-230, 1976. 1 fig., 8 ref.

Descriptors: *Recreation demand, *Estimated benefits, *Elasticity of demand, Recreation, Recreation facilities, *Water demand, Prices, Economics, Market value, Estimating equations, Forecasting, Social aspects.
Identifiers: *Travel-cost method, Excess demand.

Examination is made of irregularities which arise in use of the travel-cost method of assessing the value of publicly operated recreation sites when excess demand for the use of facilities at a particular site leads to rationing of access. Because recreation facilities have traditionally been provided at a nominal price by the public sector, no market pricing mechanism has existed to allocate resources efficiently. As a surrogate estimation technique, price value has been commonly assessed by use of the travel-cost method, in which a demand curve for the facility is determined indirectly by assuming that travel and transfer costs measure the price of the recreational experience to the consumer. But this method underestimates a consumer surplus when there is excess demand at a facility. The underestimate arises because the demand function is more elastic with respect to travel costs than it is with respect to admission charges. Excess demand causes recreationists to have to incur travel and transfer costs to reach a recreation site with uncertainty about whether they will be admitted once they arrive. As a result, under conditions of excess site demand, per capita and total benefits are underestimated. A more accurate use of the travel-cost method with excess-demand sites where there is rationing would be to correct the slope of the estimated demand curve by a factor of Pi to the tenth exponential power. (Harris-Wisconsin)
W77-03964

6E. Water Law and Institutions

WATER POLLUTION CONTROL ADMINISTRATION, A MEMORANDUM REPORT ON A RECONNAISSANCE STUDY.
Public Administrative Service, Chicago, Ill.
For primary bibliographic entry see Field 5G.
W77-03684

LEGAL SYMPOSIUM ON WETLANDS: AN EXECUTIVE SUMMARY, NOVEMBER 1974,
Virginia Inst. of Marine Science, Gloucester Point.
R. D. Anderson, D. Garten, and T. Smolew.
Available from the National Technical Information Service, Springfield, VA 22161 as COM75-10899, Price codes: A02 in paper copy, A01 in microfiche. Report to NOAA Sea Grant Program, November, 1974. 8 p, 1 fig, 2 photo.

Descriptors: *Virginia, *Wetlands, *Conferences, *Coastal marshes, Tidal marshes, Salt marshes, Legislation, Marshes, Electric power industry, Industries, Compensation, Law enforcement, Water law, Administrative agencies, Shore protection, Coastal(Coasts), Fish harvest, Legal aspects.
Identifiers: *Coastal zone management.

The purpose of the wetland symposium was to examine the non-ecological aspects of wetlands. Particular emphasis was placed on the legal implications of wetlands. With approximately 95% of Virginia's annual fish harvest dependent on wetlands comprising only land a half percent of the total area of the state, wetlands are of enormous value. After emphasizing the economic importance of wetlands to the state, speaker at the symposium examined the consequences of marsh use, the legislative intent of the 1972 Virginia Wetlands Act, enforcement and administrative aspects of the act, and the act from the viewpoint of the electric power industry. Also covered were wetlands legislation in other states and the taking issues as it relates to wetlands. (Capehart-Florida)
W77-03685

SECTION 208 PROGRAM REVIEW, (ENVIRONMENTAL PROTECTION AGENCY), (DRAFT).
Environmental Protection Agency, Washington, D. C. Program Evaluation Div.
For primary bibliographic entry see Field 5D.
W77-03686

THE INTERNATIONAL LAW OF SCIENTIFIC RESEARCH IN THE OCEANS,
Harvard Law School, Cambridge, Mass.
R. R. Baxter.
Georgia Journal of International and Comparative Law, Vol 6, p 27-39 (1976). 13 p, 45 ref.

Descriptors: *Continental shelf, *Political aspects, *Research and development, *International law, *Oceans, International agreements, Foreign waters, Treaties, United Nations, Law of the sea, Research priorities, Water resources, Projects, Testing, Planning.

In the absence of any future agreements, the Geneva Conventions of 1958 will govern ocean research. While seabed research will be permitted, Continental Shelf research will require the consent of the coastal state. Because of the coming enlargement of offshore economic zones, research will be in danger of being restricted at a time when research teams should be given full rights to explore the ocean for the benefit of all people. Many nations are taking different negotiating positions with regard to the research issue. The developing nations known as the Group of 77 want: (1) active participation and representation by the coastal state, whereas the United States believes the coastal state should only have to be given advance notification of the impending research; (2) publication of the results of the research to be forbidden without the consent of the coastal state, whereas the United States insists that the research should be shared on an unlimited basis; and (3) assistance, when requested by the coastal state to be mandatorily furnished, while the American position is that assistance should be given only towards assessing the collected data. (Frank-Florida)
W77-03687

THE CALIFORNIA COASTAL PLAN (A SYMPOSIUM).
S Cal L Rev, Vol 49, No 4, p 710-83 (1976). 74 p.

Descriptors: *California, *Land use planning, *Coastal areas, *Coastlines, *Land management, Regional economics, Urban land use, Land development, Land resources, Comprehensive planning, Long-term planning, Cost-benefit analysis, Governmental interrelations, Industries, Governments, Political aspects, Legal aspects, Building codes, Regulation.
Identifiers: *California Coastal Plan, California Coastal Zone Commission, Orange County(Calif), Administrative regulations.

The California Coastal Plan and the legislation designed to implement that plan are evaluated and criticized here in five articles. While the broad objectives of the coastal plan, to preserve and manage the limited coastal resources of California, are applauded, the vague and ambiguous language used in the document's 162 policy recommendations is uniformly denounced. In addition, several specific attacks are made against particular provisions. For example, the plan's decision to maintain presently agricultural land in agricultural production ignores both the loss in land value to farmers who purchased coastal land with the expectation to sell for development and the attendant increase in coastal housal costs such a restriction will cause. The plan advocates high density urban development and discourages sprawl, however, in so doing it fails to consider consumer desires and may perhaps lead to a construction standstill or at least a significant slowdown. The plan's reliance on local implementation is problematic as local authorities were not allowed to participate on the commission. Also, the plan and corresponding legislation fail to establish any concrete guidelines for local authorities who may well resent the usurpation of local land-use planning powers. As a result, not only will state and local relations be strained, but the efficiency of the entire project will be diminished by the extensive litigation needed to determine the meaning and validity of the proposed coastal plan. (Moorhouse-Florida)
W77-03688

CALIFORNIA WATER LAW IN PERSPECTIVE,
California State Water Resources Control Board, Sacramento.
G. M. Craig.
In: West's Annotated California Water Code, p LXV-CVII (1971).

Descriptors: *Prior appropriation, *California, *Water rights, *Water districts, State governments, Water resources, Cities, Appropriation, Prescriptive rights, Water pollution, Water quality control, Water distribution(Applied), Flood control, Dams, Financing, Investigations, Public health, Irrigation, Reclamation.
Identifiers: *Water Resources Control Boards.

California's water law combines two principal doctrines of water rights based on opposing principles, the doctrine of appropriative rights and the doctrine of riparian rights. In addition, California recognizes the rights of the overlying owner to the use of groundwater and rights secured by prescription. This article examines the historical development of water rights in California and the most recent trends, which focus on stopping pollution of water. The following state government agencies are discussed: (1) The Department of Water Resources, whose responsibilities include the planning, construction and operation of the State Water project; (2) The State Water Resources Control Board, with powers including appropriation of water, determination of water rights and water quality control; (3) The Regional Water Quality Control Boards, with powers including formulation and adoption of plans for all areas in the region. Also examined briefly are several other agencies including, The California Water Commission, The Reclamation Board and the State Treasurer. (Martin-Florida)
W77-03689

BPT: CONSIDER THE ALTERNATIVES (BEST PRACTICAL TREATMENT CRITERION).
For primary bibliographic entry see Field 5D.
W77-03690

LEGAL CONSTRAINTS ON URBAN WATE SYSTEMS,
Colorado State Univ., Fort Collins. Dept. of Civ Engineering.
For primary bibliographic entry see Field 3D.
W77-03692

ANALYSIS OF THE NATIONAL FLOOD I SURANCE ACT,
Florida Univ., Gainesville. School of Law.
M. T. Hensick.
Available from Eastern Water Law Cente University of Florida, Gainesville, Fla. 3261 $2.70. (1975). 54 p, append.

Descriptors: *Flood plain insurance, *Project pu poses, *Project planning, *Flood protectio *Flood plain zoning, *Floodproofing, Maximu probable flood, Flood peak, Erosion, Flo frequency, Flood recurrence interval, Flood ro ing, Flood control, Flood damage, Building code Land use, Economics.

The National Flood Insurance Act and its 19 amendments provide federally subsidized flo and mudslide insurance protection in high ri areas. Coverage includes residential, governme tal, agricultural, religions and small business pr perty and is administered through use of priva carriers. Maximum coverage limits and premiu rates are set by law. Entrance into the program dual phased and requires formal application f community coverage. The initial or emergen coverage phase of coverage involves subsidiz rates and 1/2 limit coverage. After ratemaking st dies are made and after the community proves adoption of land use and control measures, t community is eligible for full coverage at actuar rates. Land use and control measures basica require community planning to prevent constr tion and improvement in areas below the 100 ye flood level or in areas of special hazard. Failure communities to comply with land use measu can result in ineligibility under the program. promote congressional intent the Act, as amende also requires purchase of flood insurance as a co dition to the grant of any federal assistan Federal assistance is defined as including loa grants, guarantees and any direct or indirect a including mortgage insurance. (Comer-Florida)
W77-03693

ARTIFICIAL AND NATURAL LAKES,
Florida Univ., Gainesville. School of Law.
A. R. Wiedinger.
Available from Eastern Water Law Cent University of Florida, Gainesville, Florida 326 $1.30. (Spring, 1976), 26 p.

Descriptors: *Florida, *Lakes, *Water la *Ownership of beds, *Artificial lakes, *Navigat water, Riparian rights, Beds, Water resourc Water sources, Irrigation, Bodies of water, S face waters, Lake shores, Lake basins, Recr tion.
Identifiers: *Public trust doctrines.

Ownership and rights of use of two lakes Sunshine Shores, Florida are unclear. T specific problem serves as a focal point for a stu of the laws of lake ownership in general in Flori Related topics examined include: navigability a its different tests; common-law riparian rights abutting landowners; statutory and regulat modification of rights; and subdivision rights. A statutory and regulatory modification of righ and subdivision rights. Also presented is a histo of lake ownership laws from the 1821 Treaty Cession onward. The historic test of navigabil fails, however, when applied to the two lakes Sunshine Shores because they are not naviga waters; consequently, they may be privat owned. In addition to the problems of ownersh there are other legal problems to be considered the construction of lake-connecting irrigat ditches, seawalls and docks, and in the pumping

r for irrigation. Furthermore, all lakes are not
ly similar with many distinctions made
een natural and artificial lakes. Thus, the type
extent of construction and irrigation allowed
depend on numerous considerations. (Frank-
da)
-03694

NERSHIP OF SUBMERGED LANDS IN
RIDA,
ni Univ., Coral Gables, Fla. School of Law.
Ausness.
lable from Eastern Water Law Center,
ersity of Florida, Gainesville, Florida 32611,
. (1973), 105 p.

riptors: *Florida, *Beds under water,
nership of beds, *Navigable waters,
ngrove swamps, Wetlands, Coastal marshes,
ow water, Surface waters, Land tenure,
ndaries(Property), Boundary disputes, Regu-
n, Permits, Water conservation, Natural
rces.
tifiers: *Navigability tests, *Public trust doc-
, Navigational servitude, Estoppel, Fill per-
Water rights(Non-riparian), Statute of limita-
.

n Federal surveys of Florida waters were
e, snakes and Indians posed a problem. As a
t, only about 200 of the 30,000 lakes were
ndered. After title to swamplands passed to
da in 1850 the state conveyed some 19 million
s to private owners. Unfortunately some of
swampland conveyed was actually navigable
r. Since Florida doesn't rely on meandering
on 'navigability in fact' to determine owner-
the question of ownership under the public
doctrine of submerged lands is significant.
ably neither Florida's 'Grant to Reparians'
nor the Marketable Record Title Act will cure
nvalid transfers of sovereignty land but the
may be stopped from challanging the con-
nces so ownership is still a problem. In con-
on with ownership, use rights to fill the lands
s regulation questions. The federal govern-
through the Corps of Engineers can regulate
perations and will probably be more active
n state action is absent. Florida should enact
ng-type fill regulations to assure that the en-
nment is protected. (Comer-Florida)
-03695

AL PROTECTION FOR FLORIDA WET-
DS,
da Univ., Gainesville. School of Law.
ampbell.
lable from Eastern Water Law Center,
ersity of Florida, Gainesville, FL 32611, $.85.
mer 1975), 17 p.

riptors: *Marsh management, *Florida,
tlands, *Protection, Legislation, Marshes,
tal marshes, Salt marshes, Tidal marshes,
, Swamps, Rivers and Harbors Act, Legal
cts, Lakes, Ponds, Flood protection, Flood
rol, Flood plains, Estuaries, Fish, Shellfish.

value of Florida's wetlands in their natural
has been underestimated. Wetlands, includ-
idal marshes, estuarine zones, swamps, lakes
onds, have the capacity to absorb vast quan-
of water thereby acting as natural means of
control. Developers, however, view them as
s for creating expensive water front property
panding industry. Wetlands have phenomenal
uctivity, are vital in the production and sur-
of waterfowl and certain fur-bearing animals
ish. The development and destruction of wet-
has had a devastating effect on the harvest-
f fish and shellfish. Certain federal and state
have been implemented to prevent further
uction. These include the Rivers and Harbors
of 1898, The Fish and Wildlife Coordination
of 1970, the National Environmental Policy
Florida's State Parks and Preserves System,
the State Wilderness System Act, the Bulkhead Act, and the Land and Water Management Act. The latter two acts are Florida's most important laws with respect to preservation. (Cowart-Florida)
W77-03696

LEGAL ASPECTS OF COASTAL ZONE MANAGEMENT IN ESCAMBIA AND SANTA ROSA COUNTIES, FLORIDA ('ESCAROSA'),
Miami Univ., Fla. School of Law.
D. M. O'Connor.
Available from Eastern Water Law Center, University of Florida, Gainesville, Florida 32611, $5.35. March 1972, 107 p.

Descriptors: *Shore protection, *Local governments, *Coordination, *Florida, *Water law, Legislation, Judicial decisions, Local governments, State governments, State jurisdiction, Federal government, Federal jurisdiction, Shores, Fisheries, Wildlife habitats, Wildlife conservation.
Identifiers: *Coastal zone management.

While many studies have been done on federal and state laws relating to coastal zone management, far less emphasis has been placed on action at county and local levels. Examined here are the legal aspects of coastal zone management in the Escambia and Santa Rosa Counties of Florida. An entire statutory history is given, as well as relevant judicial decisions. The resulting conclusion is that local governments can play a greater role than they have been. The following recommendations are made: (1) local decisions should be made in conformity with the Florida Coastal Zone Master Plan; (2) the Attorney General should clarify the extent of authority of the Coastal Coordinating Council; (3) the Council should serve as the single coordinating body at the state level for all local decisions; (4) local levels of government should develop future use plans for these coastal zones; and (5) local governments should research and prepare whatever new ordinances are needed. (Frank-Florida)
W77-03697

ENVIRONMENTAL PROTECTION IN MEXICO AND CANADA,
Florida Univ., Gainesville. School of Law.
L. A. Lewis.
Available from Eastern Water Law Center, University of Florida, Gainesville, Florida, 32611, $1.55. May 27, 1976, 31 p.

Descriptors: *Canada, *Mexico, *Environmental control, *Protection, Pollution abatement, Air pollution, Water pollution, Abatement, Water pollution control, Legal aspects, Common law, International law, Regulation, Legislation, Planning, Administration, Governments, Remedies, Ecology, Environment, Environmental effects.

Existing problems of protecting the ecosystems remain, and new problems will appear with new technological developments. Thus protection of the environment is not a moot issue. To illustrate various problems that exist, the author compares the environmental problems and legal solutions of Mexico and Canada. Mexico furnishes an example of a developing third world nation rapidly discovering the competing demands of the ecology and an economic development policy. Mexico has recently enacted comprehensive and forceful anti-pollution legislation; its effect can only be judged in the future. Canada's problems with pollution parallel those of the United States and differ from those of Mexico. Various common law remedies have been available to Canadians suffering damage as a result of pollution, but statutory remedies are also necessary. The steps taken by Canada to prevent pollution are similar in many ways to those taken in the United States. The author stresses the beneficial aspects of nations trading information regarding pollution control. (Cowart-Florida)
W77-03698

COASTAL ZONE MANAGEMENT IN FLORIDA,
Florida Univ., Gainesville. School of Law.
D. Welch.
Available from Eastern Water Law Center, University of Florida, Gainesville, Fl. 32611, $1.80. Spring 1976. 36 p, 96 ref.

Descriptors: *Florida, *Coasts, *Comprehensive planning, *Land use, *Regulation, Planning, Environmental effects, Human population, Waste disposal, Erosion, Oil, Wetlands, Water shortage, Land management, Zoning, Local governments, State governments, Federal government, Legislation, Land resources, Long-term planning.
Identifiers: *Coastal zone management, *Coastal Zone Management Act, Land use planning.

With approximately 80% of the nation's population living in the 30 coastal states, the increasing land use pressures on the coastal zones call for coastal land management programs to protect the economic and environmental values in these areas. In the past, land use planning has been delegated to local governments resulting in haphazard, fragmented policies. The federal government has become indirectly involved in coastal zone management through the National Environmental Policy Act, the Clean Air Act of 1970 and the Federal Water Pollution Control Act as amended in 1972. Direct federal involvement came with passage of the 1972 Coastal Zone Management Act. As a result of a severe drought, the Florida legislature enacted a number of comprehensive land use controls which can be useful in the coastal zone management area. These include the Environmental Land and Water Management Act, the Land Conservation Act, the Water Resources Act, the State Comprehensive Planning Act, and the Local Government Comprehensive Planning Act. (Capehart-Florida)
W77-03699

CONTINGENCY PLAN FOR SPILLS OF OIL AND HAZARDOUS MATERIALS FOR INLAND WATERS OF REGION III.
Environmental Protection Agency, Philadelphia, Pa. Region III.
For primary bibliographic entry see Field 5G.
W77-03700

THE COSTS AND EFFECTS OF CHRONIC EXPOSURE TO LOW-LEVEL POLLUTANTS IN THE ENVIRONMENT,
For primary bibliographic entry see Field 6G.
W77-03701

GENERAL STATE POWERS OVER WATER.
Cal Water Code Ann secs 100 thru 108 (West 1971).

Descriptors: *California, *Water rights, *Public benefits, *Riparian rights, *Water utilization, Domestic water, Irrigation water, Water supply, Watersheds(Basins), Water conservation, Appropriation, Legislation, Municipalities, Water requirements, Legal aspects, Water resources.

California has enacted legislation requiring that the water resources of the state be put to beneficial use to the fullest extent of which they are capable. All water within the State is the property of the people of California, but the right to the use of water may be acquired by appropriation. The State shall determine what water, surface and underground, can be converted to public use, and in what way the water should be developed for the greatest public benefit. The use of water for domestic purposes is the highest use of water in California; the next highest use is for irrigation. Municipalities shall not acquire or hold any right to waste water or to use water for other than municipal purposes. Whenever the legislature authorizes any project which will develop water for use outside the watershed in which it

originates, it shall consider authorization of other works to satisfy the requirements of such watershed. (Martin-Florida)
W77-03703

STATE ADMINISTRATION GENERALLY (POWERS AND DUTIES OF THE DEPARTMENT OF WATER RESOURCES).
Cal Water Code Ann secs 120, 125 thru 134, 205, 225 thru 236, 250 thru 346 (West 1971).

Descriptors: *Administrative agencies, *California, *Water resources, *Artesian wells, *Eminent domain, Weather modification, Data collections, Surveys, Investigations, Water supply, Water quality, Reservoirs, Appropriation, Organizations, Reclamation, Condemnation, Properties, Water loss, State governments, Legislation, Water utilization.
Identifiers: *Yuba River.

California has enacted legislation providing that, subject to the approval of the governor, the Director of Water Resources is responsible for organizing the Department of Water Resources. The Department is authorized to: (1) carry on topographic surveys and investigations into matters pertaining to the water resources of the State along the lines of hydrography, hydroeconomics, and the use and distribution of water for agricultural purposes; (2) investigate conditions of the quality of all waters within the State; (3) condemn for State water and dam purposes any real property which it is authorized to acquire; (4) take appropriate proceedings to prevent waste and unreasonable use of water in the State. Furthermore, any person owning, possessing, or occupying any land upon which is situated an artesian well and who causes water unnecessarily to flow from the well or to go to waste is guilty of a misdemeanor. Finally, any funds appropriated for Yuba River debris control shall be used for restraining, impounding and control of debris resulting from mining operations, natural erosion or other causes. (Martin-Florida)
W77-03704

KLAMATH RIVER BASIN COMPACT.
Cal Water Code Ann secs 5900 thru 5901 (West 1971).

Descriptors: *Interstate compacts, *California, *Oregon, *River basins, *Water pollution control, Legislation, Appropriation, Water rights, State governments, Permits, Natural resources, Environmental effects, Hydroelectric power, Administration, Conservation, Planning, Legal aspects, Rivers, Irrigation, Water distribution(Applied).
Identifiers: *Klamath River basin(Ore).

The major purposes of the Klamath River Basin Compact are to facilitate and promote the orderly, integrated and comprehensive development, use, conservation and control of the basin's water resources; and to further intergovernmental cooperation and comity with respect to these resources and programs for their use and development. Rights to the use of unappropriated waters originating within the Upper Klamath River Basin for any beneficial use in the basin, by direct diversion or by storage for later use, may be acquired by any person by appropriation under the laws of the state where the use is to be made. In granting permits to appropriate waters each state shall give preference to applications for a higher use in accordance with the following order of uses: (1) domestic use, (2) irrigation use, (3) recreational use, (4) industrial use, (5) generation of hydroelectric power, and (6) other uses. There is hereby created a commission to administer this compact. The states recognize that protection of the beneficial uses of the waters of the basin requires cooperative action of the two states (California and Oregon) in pollution abatement and control. (Martin-Florida)
W77-03705

OREGON- CALIFORNIA GOOSE LAKE INTERSTATE COMPACT.
Cal Water Code Ann secs 5950-5951 (West 1971).

Descriptors: *Interstate compacts, *California, *Oregon, *Lakes, *Legislation, Appropriation, Water resources, Lake basins, Planning, Administration, State governments, Regulations, Construction, Facilities, Water rights, Conservation, Legal aspects, Coordination, Water distribution(Applied).
Identifiers: *Goose Lake Interstate Compact.

The major purpose of the Goose Lake compact is to facilitate and promote the orderly, integrated and comprehensive development, use, conservation and control of the water resources of Goose Lake Basin. Export of water from Goose Lake Basin for use outside the basin without prior consent of both state legislatures is prohibited. Each state hereby grants the right for a person to construct and operate facilities for the measurement, diversion, storage and conveyance of water from the Goose Lake Basin in one state for use within the basin in the other state, providing the right to such use is secured by appropriation under the general laws administered by the State Engineer of the State of Oregon or the Water Rights Board of California. The laws of the state from which the water is to be taken shall control. Construction and operations of any facilities in one state to implement use of water in the other state, shall be subject to the laws of the state in which the facilities are constructed. (Martin-Florida)
W77-03706

TAYLOR V BOARD OF LEVEE COMMISSIONERS OF THE TENSAS BASIN LEVEE DISTRICT (A TAKING FOR LEVEE PURPOSES).
332 So2d 495-99 (La Ct App 1976). 5 p.

Descriptors: *Louisiana, *Levees, *Levee districts, *Appropriation, *Eminent domain, Engineering structures, Legal aspects, Judicial review, Flood control, Retaining walls, River regulation, Water rights, Legal review, Constitutional law, Public rights, Riparian land.
Identifiers: *Tensas Basin Levee District(La).

Plaintiff property owner brought suit against defendant levee district to recover the value of land taken for the construction of a levee. In Louisiana, appropriation by the state for the construction of levees is restricted to riparian property fronting on a navigable river when the land was first separated from the soverign. Such appropriation of riparian land does not violate the Fifth Amendment Due Process Clause. The plaintiff contended that the defendant did not meet the burden of proof by showing that the land involved was riparian property; also, he contended that the fair market value award by the lower court was not excessive in view of the evidence presented. The court upheld the lower court's finding that the property involved was not riparian and thus not subject to appropriation. The court also found that the award of fair market value of the property was not excessive and that the remainder of plaintiff's tract suffered no diminution in value as a result of the taking, but that the taking, in fact, had improved the access to the property. (Welch-Florida)
W77-03707

THE DELTONA CORPORATION V BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENR TRUST FUND.
No 73-1046 (2d Cir Ct. Leon County, Fla, Jan 31, 1975). 17 p.

Descriptors: *Lakes, *Boundary disputes, *Florida, *Navigable waters, *Meanders, Water policy, Water resources, Freshwater, Zoning, Public lands, Public benefits, Public rights, Patents, Submerged Lands Act, Equity, Nonnavigable waters, Judicial decisions, State governments, Legal aspects.
Identifiers: *Navigable in fact, *Public trust.

Plaintiff development corporation sought decla
tory and injunctive relief against defendants Bo
of Trustees of the Internal Improvement Fund,
Game and Fresh Water Fish Commission, and
intervening Attorney General of Florida. At is
was the ownership of certain nonmeandered la
which were included within the perimeters of l
granted to the plaintiff in U. S. Patents and
Trustees' deeds. The defendants contended
the lakes were navigable in fact, despite th
being nonmeandered. Based upon this contenti
the defendants argued further that the Trustees
not have the authority to convey navigable la
because the state holds title to land covered
navigable water in trust for the public. The L
County Circuit Court held that nonmeande
lakes are considered by statute to be non-navi
ble when such lakes are not excluded from
rounding property conveyed by the state in
same conveyance. Therefore, the defendants
representatives of the state were stopped from
serting their claims. The Court also noted that
tain of the conveyances at issue could be upl
through application of the Marketable Title
Therefore, summary judgment for the plain
was entered. (Josepher-Florida)
W77-03708

**BARNES V UNITED STATES (COMPENSATI
FOR FLOWAGE EASEMENT TAKEN OV
PLAINTIFFS' LANDS).**
538 F2d 865-75 (Ct Cl 1976). 11 p.

Descriptors: *Dams, *Seepage, *Condemna
value, *Judicial decisions, *Missouri Ri
Backwater, Flow control, Underseepage, C
demnation, Legal aspects, Easements, Compe
tion, Value, Riparian land, Banks, Riparian rig
Flooding, River flow, Channel flow, Rivers, R
systems, Bodies of water, Deltas, Downstre
Upstream, *Nebraska.
Identifiers: *Dam effects, Proximate causat
Statute of limitations, Niobrara River, Ga
Point Dam, Fort Randall Dam.

Plaintiff riparian landowners sought compensa
for the alleged taking of their land by the Un
States. Plaintiffs' farmlands were located adja
to the confluence of two rivers. Plaintiffs alle
that the government's control of the river
through its dams had caused frequent and re
ring flooding of their land. Since 1969, siz
water releases from the Fort Randall
between August and November each year
caused flooding of plaintiffs' land. While surf
flooding did occur in isolated areas, the plain
listed seepage, impaired surface and subsurf
drainage, and raised groundwater table as
bases for their suit. The Court of Claims held
the plaintiffs finding that a taking under the
amendment had occurred. A constitutional ta
is not limited to the overflowing of a river's ba
but includes percolation and rising water ta
provided the intermittent flooding is inevit
recurring, as was shown here, and provided
waters rise above the ordinary high water m
Defendant argued that such a taking must h
dated from 1969, and that the claim was there
barred by the statute of limitations. The c
found that the date of taking is when the
manent character of intermittent flooding ca
fairly perceived. Plaintiffs' claims for compe
tion for crops lost between 1969 and 1973 (the
of taking) were denied. The court held that the
fendant took a flowage easement appurtenan
plaintiffs' lands and must compensate plaint
upon receipt of deeds conveying perpetual e
ments to flood the land. (Moorhouse-Florida)
W77-03709

**KEMPF V ELLIXSON (DETERMINATION
RIPARIAN RIGHTS WHERE LAND
SEPARATED FROM BODY OF WATER
PUBLIC HIGHWAY).**
244 NW2d 476-78 (Ct App Mich 1976). 3 p.

WATER RESOURCES SCIENTIFIC INFORMATION CENTER U. S. DEPARTMENT OF THE INTERIOR WASHINGTON, D. C. 20240

riptors: *Riparian rights, *Judicial decisions, higan, *Lake shores, Legal aspects, Lakes, ways, Roads, Streets, Water law, Riparian Adjacent landowners, Legal review, Public as, Public rights, Trespass, Shores, Bodies of r, Recreation, Recreation demand.
ifiers: Injunctions(Prohibitory).

tiffs, front lot owners of property abutting a hore highway, sought injunctive relief to ent use of the lakeshore by defendants. De- ants, back lot owners and others, had built s out from the shore of the lake directly ss the boulevard from plaintiffs' property. An ction was granted by the trial court and de- ants appealed. Defendants contend that place- of the boulevard right-of-way in the lake es the rule that riparian rights attach to land rated from a body of water by a highway inap- ble and creates public rights in the right-of- not only for travel, but also for waterfront eation. The Michigan Court of Appeals re- d both arguments reasoning that the fact that and intervenes on the opposite side of the way merely strengthens plaintiffs' riparian s. Furthermore, to prevxent riparian rights attaching to lots abutting waterfront proper- n express limitation must be included in the dedicating the property for the roadway. De- ants' alternative assertion that a public ease- had been established was also found to be out merit. The court opined that unless there me minimal action by government to facilitate control recreational use a public easement ot be established by prescription. The judge- of the lower court was affirmed with one ex- on. Individual claims of prescriptive ease- were remanded for specific consideration of factual claim. (Moorhouse-Florida)
-03710

IAGES COMPENSABLE UNDER FEDERAL RITIME LAW FOR INJURIES CAUSED BY CHARGE OF OIL INTO NAVIGABLE TERS,
rimary bibliographic entry see Field 5G.
-03711

IDITY, CONSTRUCTION, AND APPLICA- N OF S 5 OF RECLAMATION LAW OF 1902 USCS S 431),
Eclavea.
LR Fed 831-42 (1976). 12 p.

riptors: *Reclamation, *Water utilization, ter users, *Federal reclamation Law, Legal cts, Legislation, Federal government, Judicial sions, Legal review, Social aspects, Water s, Equitable apportionment, Equity, Federal- water rights conflicts, Irrigated land, Water ation(Policy), Water contracts, Constitutional Public rights, Water law, Agriculture.
tifiers: *Reclamation Act of 1902, Stand- Legal), Water rights(Non-riparian).

ion 5 of the Reclamation Act of 1902 prohibits ale of the right to use water for land in private ership if the plot exceeds 160 acres. The act requires that the owner of such land be a bona resident of such land, or live in the neighbor- . This act has been strictly construed in litiga- It has been held that the language of the act is latory and not discretionary. Litigants have enged the acreage requirement on equal pro- on and due process grounds of the fifth and eenth amendments to no avail. The courts reasoned that the federal reclamation pro- were established as a subsidy to agriculture, hat since such projects were subsidies, Con- could decide who should be subsidized. In lding the residency requirement, courts have d that while discrimination between new and residents is not allowed; discrimination een residents and non-residents is permissi- Courts have granted standing to enforce the o any resident of property in the vicinity of a tract acquiring water in violation of the act's provisions. (Moorhouse-Florida)
W77-03712

BOYER V DEPT OF HEALTH (LOCATION OF LEACH FIELD RELATIVE TO WATER SUPPLY).
381 NYS2d 805-08 (App Div 1976). 4 p.

Descriptors: *Wells, *New York, *Sanitary engineering, *Sewage disposal, *Water permits, Legal aspects, Control, State governments, Environmental engineering, Disposal, Effluents, Environmental sanitation, Public health, Wastes, Plumbing, Septic tanks, Leaching, Judicial decisions, Adjacent land owners, Waste disposal.

Plaintiff property owner brought suit to vacate approval of defendant adjoining land owner's subsurface sanitary disposal system and to vacate the certificate of occupancy. Plaintiff was serviced by two wells located upon his property. Defendant's newly constructed septic system was 84 feet from the well on plaintiff's property and thus in noncompliance with the State Sanitary Code standards. Health Department affidavits, however, indicated that there was no possible way that defendant could literally comply with the standards. The court held that standards were not mandatory but were merely a guide or recommendation to be interpreted in light of the complexities of the particular area. The court further held that it was within the fact-finding province of the Health Department to determine whether defendant's sanitary disposal system should be approved and that the determination was not arbitrary or illegal under the circumstances. Thus, the lower court decision dismissing the complaint was affirmed. (Welch-Florida)
W77-03713

KATTOR V SABATINI (NO RIGHT OF DIVERTING SURFACE WATER BY ARTIFICIAL CHANNEL).
351 NE2d 553-55 (Mass App Ct 1976). 3 p.

Descriptors: *New York, *Runoff, *Artificial watercourses, *Surface waters, *Surface runoff, Surface drainage, Legal aspects, Judicial decisions, Drainage water, Overland flow, Watercourses(Legal aspects), Adjacent landowners, Equity, Legal review, Prescriptive rights, Water law, Water rights.
Identifiers: *Injunctive relief.

Plaintiff landowner sought to enjoin defendant adjoining landowner from channeling surface water onto plaintiff's property. Defendant had constructed a gravel drainage system on his land to catch water and prevent it from flowing toward his building and parking lot. The water caught was channeled onto plaintiff's land and not into a natural water course. The lower court did not issue an injunction because plaintiff inadvertently allowed a sign overhang of one foot to intrude on defendant's property. The appellate court held this was insufficient basis for the defense of 'unclean hands' and upheld the settled principle that a landowner may not divert surface water onto an adjoining landowner's property by an artificial channel. The court further held that the injunction should have been issuded to prevent the continuing trespass and the possible arising of prescriptive rights. Even though no monetary damage was proven, this did not negate a finding of a continuing injury. (Welch-Florida)
W77-03714

CANAL AUTHORITY V OCALA MANUFACTURING ICE AND PACKING COMPANY (CONSTRUCTION OF CROSS FLORIDA BARGE CANAL).
332 So2d 321-27 (Fla 1976). 7 p.

Descriptors: *Condemnation, *Florida, *Canal construction, *Canals, *Eminent domain, Legal aspects, Inland waterways, Transportation, Bodies of water, Right-of-way, Water law, Judicial decisions, Federal jurisdiction, State jurisdiction, Competing uses, Project planning, Planning.

Appellant Canal Authority brought eminent domain proceedings to condemn the fee simple title of five parcels of land owned by the appellee for construction of the Cross-Florida Barge Canal. The Canal Authority acquired fee simple title to two of the parcels, acquired perpetual easements over two other parcels, but was unable to obtain any judgment as to the remaining parcel. The Canal Authority then asked the U. S. Army Corps of Engineers to acquire that parcel by means of a federal eminent domain suit. Appellee subsequently brought this action to recover damages resulting from the change. The Supreme Court of Florida held that the Canal Authority had statutory authority to seek the aid of the Corps of Engineers, and that it would not require payment to appellee of any losses in fees and costs resulting from the Canal Authority's abandonment of state action to condemn the land. (Cowart-Florida)
W77-03715

CLEAR LAKE APARTMENTS, INC V CLEAR LAKE UTILITIES (EXCLUSIVE RIGHT TO PROVIDE WATER NOT A COVENANT RUNNING WITH THE LAND).
537 SW2d 48-55 (Tex Civ App 1976). 8 p.

Descriptors: *Texas, *Water contracts, *Contracts, *Supply contracts, *Municipal water, Water rights, Legal aspects, Water law, Judicial decisions, Common law, Equity, Jurisdiction, Water supply, Sewerage, Water delivery, Water conveyance.

Plaintiff water supplier brought this declaratory judgement action to determine the status and validity of a contract between plaintiff and defendant apartment owner and of another contract between plaintiff and defendant city water authority. The contract between plaintiff and defendant landowner's predecessor in interest had granted plaintiff exclusive rights to furnish water and sewer service. The contract between plaintiff and defendant municipal water authority also granted plaintiff the exclusive right to furnish services to the particular area concerned. The court rejected plaintiff's contention that the just contract was a covenent that ran with the land and bound successors in interest to the land. The agreement was not sufficient to create an equitable interest in the land in plaintiff; thus, the other property owners in the tract of land were not bound by the court's decision. The failure to join the other landowners in the tract, necessary parties to such a suit, denied the court jurisdiction to enter a declaratory judgement concerning the contract with the municipal water authority. The court found, however, that a contract between the defendant water authority and the municipality concerning water service rights did not violate the authority's contract with the plaintiff. (Welch-Florida)
W77-03716

STATE EX REL COX V WOLFE (STATUTE PROHIBITING REMOVAL OF MATERIAL FROM BED OR BANKS OR FILLING OF WATERS OF STATE WITHOUT A PERMIT).
549 P2d 1281-83 (Ore Ct App 1976). 3 p.

Descriptors: *Landfills, *Oregon, *Water permits, *Channel flow, *Diversion, *Alteration of flow, Channels, Routing, Streamflow, Barriers, Bypasses, Flow, Stream improvement, Legal aspects, Legislation, Drainage engineering.
Identifiers: *Injunctions(Mandatory), *Fill permits, *Injunctive relief.

Plaintiff state land division sought a mandatory injunction against defendant to require defendant to restore a diverted stream to its natural channel. Defendant sought a state permit to divert the stream and remove material from the proposed new channel into the diverted stream. The permit was denied. The plaintiff contended that defendant had proceeded with his diversion without a permit resulting in irreparable damage. The defendant contended that the amount of material removed was not specified as required by statute, and thus that plaintiff had not stated a cause of action. The court held for the defendant. In order to state a cause of action the statute required that plaintiff allege the removal or fill of at least 50 cubic yards of material. (Welch-Florida)
W77-03717

KRAVEC V STATE (INTERIOR LAND OWNERS' RIGHT TO BRIDGE STATE'S DRAINAGE DITCH EASEMENT).
382 NYS2d 181-85 (App Div 1976). 5 p.

Descriptors: *New York, *Drainage systems, *Legal aspects, *Drainage water, *Easements, Drainage practices, Drainage, Drainage programs, Condemnation, Public access, Right-of-way, Ditches, Judicial decisions, Legal review, Severance, Compensation, Damages.

Plaintiff landowner brought suit to recover damages from defendant state for defendant's appropriation of a permanent drainage easement over plaintiff's vacant lot. Plaintiff's lot contained an easement appropriated by defendant along with an easement granted by plaintiff's predecessor in title to Onondaga County. Defendant's easement reservation was for use as a drainage structure while the county's easement was for any public use. The plaintiff contended that defendant's easement denied them access to the interior access of their lot. Defendant contended that the right of access was not impaired and that bridging the easement would not affect the drainage. The court held that while easements are to be construed strictly against the state, in this instance the defendant's easement permitted plaintiff to obtain access to their interior lands by bridging the ditch since this would not interfere with the defendant's use of the easement as a drainage structure. Since the county easement was 'for public use' and there was no reservation of rights to the landowner, plaintiff was barred access to the interior lands through the county's easement. (Welch-Florida)
W77-03718

PROTECTION OF WATER SUPPLY.
Okla Stat Ann, Tit 11, secs 298 thru 310.1 (1959).

Descriptors: *Oklahoma, *Water supply, *Cities, *Water works, Streams, Reservoirs, Water districts, Public health, Highways, Contracts, Eminent domain, Federal government, Water rights, Financing, Pipelines, Pollution, Protection, Water quality control, Irrigation, Land tenure, Water pollution control, Lakes, Right-of-way, Legislation.

A city whose water supply comes from a body of water outside the city limits may designate a water district encompassing the watershed to protect the water supply. A city which has acquired a reservoir site for a water supply may close any public road leading to or through such site. A city which owns a water works may use the water for public purposes outside the city limits. If there is an excess of water, the city may sell it to parties outside the city limits. Contracts for such sale may be abrogated at any time the water is required within the city. A city may acquire land for anticipated water requirements either within or without the city limits through eminent domain. A city may join with another city to finance construction of a joint water works upon approval of the voters of each city. A city may acquire land or water rights from an adjoining state when the land is within the desired watershed. Under limited circumstances, a city in an adjoining state may acquire land within Oklahoma for use in connection with a municipal water system. (Capehart-Florida)
W77-03719

MARINE SANITATION.
Cal Harbors and Navigation Code Ann secs 775 thru 786 (West Supp 1976).

Descriptors: *California, *Environmental sanitation, *Waste disposal, *Ships, Bodies of water, Boats, Sewage wastes, Regulation, Marinas, Law enforcement, Cities, Local governments, Public health, Water pollution, Waste water(Pollution), Sewage effluents, Legislation.
Identifiers: *Injunctive relief, *Marine sanitation devices.

The state of California has adopted uniform standards and procedures for the regulation of sewage discharge from vessels into state waters. Local governments may regulate the discharge of sewage from vessels but may not restrict the type of marine sanitation device installed in a vessel. Marine terminals shall provide sewage retention device pumpout facilities at locations which are convenient and accessible to boat owners. Such facilities must be operated so as to prevent the discharge of any sewage into state waters. The State Water Resources Control Board shall adopt standards for the construction, operation, and maintenance of pumpout facilities. (Capehart-Florida)
W77-03720

DELETERIOUS SUBSTANCES IN STREAMS.
Okla Stat Ann, Tit 29, sec 408 (1958).

Descriptors: *Oklahoma, *Pollutants, *Water pollution, *Bodies of water, Streams, Lakes, Ponds, Lime, Explosives, Poisons, Sawdust, Saline water, Oil, Surface runoff, Testing, Administrative agencies, Penalties(Legal), Toxins, Fish population.

No deleterious substance such as lime, dynamite, poison, drugs, sawdust, salt water or crude oil shall be placed in or allowed to wash into any stream, lake or pond in Oklahoma, except that the Game and Fish Commission may use drugs and chemicals in connection with scientific testing. Fines are established for any person violating this provision. (Capehart-Florida)
W77-03721

OWNERSHIP OF WATER.
Okla Stat Ann Tit 60, sec 60 (1971).

Descriptors: *Oklahoma, *Land tenure, *Natural flow doctrine, *Streamflow, Surface waters, Real property, Groundwater, Streams, Domestic water, Natural flow, Obstruction to flow, Pollution, Appropriation, Public rights, Dams, Administrative agencies, Water storage, Legal aspects, Riparian rights.

Oklahoma has enacted legislation declaring that a land owner owns the water standing on his land or flowing over or under its surface if the water does not form a definite stream. Water which does run in a definite stream may be used by a land owner, and the stream may even be dammed as long as the natural flow of the stream leaving the property remains the same as that entering the property. The landowner may not pollute the waters of the stream since they are public waters subject to appropriation by the state. (Capehart-Florida)
W77-03722

ACQUISITION OF PROPERTY (ISLANDS).
Okla Stat Ann tit 60, secs 337 thru 340 (1971).

Descriptors: *Accretion(Legal aspects), *Oklahoma, *Islands, *Boundaries(Property), *Land tenure, Navigable waters, Beds, Non navigable waters, Rivers, Channels, Shores, Streams, Streamflow, State governments, Real property, Public lands, Legal aspects, Stream beds, Legislation.

The ownership of islands in the state of Oklahom is herein defined. The state owns islands or accu mulations of land formed in navigable streambed unless there is another existing title or prescrip tion. In non-navigable streams, islands belong t the landowner of the shore on the side where th island has formed. If an island is not on one side, is divided between the owners on each side by line along the center of the stream. If a strea forms an island by cutting a new channel, th island remains the property of the original owne If a stream shifts its course, the owners of the lan occupied by the stream become owners of th former streambed in proportion to the amount o land lost. (Capehart-Florida)
W77-03723

WATER AND SEWAGE.
Okla Stat Ann tit 63, secs 1-901 thru 1-910 (1973).

Descriptors: *Oklahoma, *Public health, *Sewag disposal, *Water supply, *Water, Sewag Streams, Groundwater, Surface waters, Domest wastes, Industrial wastes, Potable water, Wa regulations, Water pollution, Standards, Wat works, Water distribution(Applied), Wat storage, Water purification, Construction, Pe mits, Administrative agencies.

Oklahoma has enacted legislation providing th pollution of water-bearing strata shall be avoide by the plugging of abandoned or unused wat wells. Willful or malicious contamination of a water source or water-bearing strata which is may be used for domestic use is unlawful. Th state board of health shall regulate the supply water for domestic use and the construction an operation of waterworks and sewage treatme systems. In addition, the board is authorized maintain and operate laboratories to investiga the need for and the operation of sewage treatme plants. A permit from the health commissioner required of any person supplying water to th public. Permits are also required for the constru tion of a sanitary sewer system and for th discharge of sewage into the waters of the stat Such discharge of sewage will be permitted only there is no adverse affect on public healt (Capehart-Florida)
W77-03724

WATER TRANSPORTATION SERVICE.
Okla Stat Ann Tit 17 secs 159.11 thru .26 (Sup 1975).

Descriptors: *Utilities, *Oklahom *Transportation, *Water conveyanc *Regulation, Pipelines, Water, Canals, Admini trative agencies, Pollution, Water rights, Wat loss, Conveyance structures, Water distrib tion(Applied), Financial feasibility, Feasibilit Project feasibility, Legislation.

A certificate of public convenience and necessi must be obtained from the Oklahoma Corporatio Commission before any person may construct water transportation line to carry water for publ purposes. Duplicate or competing lines will not b permitted unless they are required for adequa public service. Application for a certificate mu include information about the physical and fina cial feasibility of the project, the financial abili of the applicant, and the construction schedule f the project. The applicant must also show th there will not be an excessive water loss throug the project facilities and that the water will not b polluted or degraded while in the project facilitie The rates of the water transportation line will b

ed by the Corporation Commission. This
es not apply to certain governmental units
as water districts, or to municipalities,
companies operating water transportation
or their own use, and federal or state agen-
3725

EMNATION OF LAND AND WATER
TS.
Stat Ann, tit 11, secs 292-293 (1959) as
ed (Supp 1975).

ptors: *Oklahoma, *Cities, *Condemnation,
works, Land, Water rights, Non-navigable
, Legislation, Dams, Rivers, Streams,
ion, Water courses(Legal aspects), Protec-
ollution, Eminent domain, Water manage-
pplied), Watershed management, Water
, Reservoirs.

oma has enacted legislation granting to cities
ver to dam any non-navigable waterway and
demn such land as is needed for the con-
on of a municipal waterworks. A city may
vert water from the waterway when neces-
long as the diversion does not change the
channel of the waterway. A city may
land to protect a water supply reservoir
contamination or pollution. Except as
d for reservoir protection or for water use,
shall be made of and no structure shall be
on land within 660 feet of the high water
a reservoir. (Capehart-Florida)
3726

ES, DRAINS AND DITCHES,
onst, art XVI, sec 3. (not dated).

ptors: *Oklahoma, *Drainage systems,
tion ditches, *Taxes, Levees, Drains,
s, Irrigation, Legislation, Crops, Bond is-
Real property, Legal aspects, Land tenure,
overnments, Engineering structures, Chan-
Water management(Applied), Operating
Financing.

necessary, the legislature shall provide for a
of levees, drains, and ditches and of irriga-
These systems shall be financed by taxes
against the lands or the crops produced on
ffected or benefited by such a system. Land
or lessees of benefited lands will be
d to issue bonds. (Capehart-Florida)
3727

R PROBLEMS IN THE COLORADO
BASIN: LEGAL AND INSTITUTIONAL
EWORK,
mic Research Service, Washington, D.C.
mary bibliographic entry see Field 5G.
3830

TUTIONS AND OBJECTIVES ON THE
R, ENERGY, ENVIRONMENT INTER-
d Univ., Cambridge, Mass.
mary bibliographic entry see Field 6B.
3934

OTE SPEECH, SECOND ANNUAL CON-
ICE ON RESTORATION OF COASTAL
TATION IN FLORIDA,
nmental Protection Agency, Atlanta, Ga.
mary bibliographic entry see Field 5G.
3943

NATIONAL FLOOD INSURANCE PRO-
: EXPLANATION AND LEGAL IMPLI-
NS,
l Highway Administration, Washington,
ffice of General Counsel.
mary bibliographic entry see Field 6F.

W77-03956

MULTIPURPOSE DEVELOPMENT ON THE TISZA RIVER.
For primary bibliographic entry see Field 4A.
W77-03957

LEGAL PROBLEMS IN CHANGING USES OR COORDINATING USES OF KEYHOLE RESERVOIR,
Wyoming Univ., Laramie. Water Resources Research Inst.
K. D. Wagner.
Land and Water Law Review, Vol 9, p 485-506 (1974). 22 p, 101 ref. OWRT A-999-WYO(20).

Descriptors: *Wyoming, *South Dakota, *Interstate compacts, *Reservoir operation, *Recreation, Recreation facilities, Competing uses, Irrigation water, Water allocation(Policy), Water management(Applied), Water distribution(Applied), Water levels, Water supply, Interstate rivers, Missouri, Watersheds(Basins), Legal aspects.
Identifiers: *Keyhole Reservoir, *Belle Fourche River, *Belle Fourche River Compact, *Missouri River Basin Project, National Environmental Policy Act, Environmental impact statement.

Wyoming's Keyhole Reservoir located on the Belle Fourche River was built by the Bureau of Reclamation for the specific purpose of supplemental irrigation. The Belle Fourche River Compact allocates the privilege of purchasing 10% of the reservoir capacity to Wyoming and the remaining 90% to South Dakota. South Dakotans have failed, however, to negotiate water contracts and the reservoir's principle use has been recreational. While such use is recognized as one of many authorized by the Missouri River Basin Project, the Bureau's main objective remains the collection of allocated reimbursable costs to which recreation contributes little. Thus, a conflict between consumptive, revenue-generating uses and nonconsumptive recreational use has arisen. Possible solutions to the user conflict include: (1) 'Mutual Water Administration' wherein moderate long-term industrial use is combined with recreational use; (2) 'Alternative Supply' in which water from a supplemental source is used to fulfill consumptive needs; (3) state purchase, although under the compact Wyoming may only purchase 10%; and (4) a legislative change to protect recreational use. The likelihood of effectuating any change, however, rests on the ability to convince the administrator that the changed use will increase the cost-benefit ratio without substantially affecting repayment, and the administrator's ability to convince Congress by the required impact statement that the changes will enhance both the quality of the environment and national economic development. (Moorhouse-Florida)
W77-03973

FORECASTINGS A LINE OF INVESTIGATIONS OF MEMBER COUNTRIES OF THE COUNCIL OF MUTUAL ECONOMIC ASSISTANCE IN THE AREA OF ENVIRONMENTAL HYGIENE, (IN RUSSIAN),
Institute of General and Municipal Hygiene, Moscow (USSR).
For primary bibliographic entry see Field 5G.
W77-04016

NONPOINT SOURCES OF POLLUTION: A FEDERAL PERSPECTIVE,
Environmental Protection Agency, Washington, D. C. Div. of Water Planning.
For primary bibliographic entry see Field 5G.
W77-04017

THE INTEGRATION OF DESALINATION PLANT WITH EXISTING AUSTRALIAN WATER RESOURCES,
New South Wales Univ., Kensington (Australia). School of Nuclear Engineering.
For primary bibliographic entry see Field 3A.
W77-04018

HYGIENIC ASPECTS OF PROTECTION OF WATER RESOURCES IN THE LIGHT OF THE RESOLUTION BY THE CENTRAL COMMITTEE OF THE COMMUNIST PARTY OF THE SOVIET UNION AND THE COUNCIL OF MINISTERS ON 'MEANS OF PREVENTING POLLUTION OF THE VOLGA AND URAL RIVER BASINS BY UNTREATED SEWAGE', (IN RUSSIAN),
For primary bibliographic entry see Field 5G.
W77-04096

6F. Nonstructural Alternatives

ANALYSIS OF THE NATIONAL FLOOD INSURANCE ACT,
Florida Univ., Gainesville. School of Law.
For primary bibliographic entry see Field 6E.
W77-03693

LEGAL ASPECTS OF COASTAL ZONE MANAGEMENT IN ESCAMBIA AND SANTA ROSA COUNTIES, FLORIDA ('ESCAROSA'),
Miami Univ., Fla. School of Law.
For primary bibliographic entry see Field 6E.
W77-03697

ASSESSMENT OF FLOOD MANAGEMENT ALTERNATIVES AGAINST SOCIAL PERFORMANCE CRITERIA, PHASE II REPORT,
Institute of Public Administration, New York.
R. Mack.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-249 543, Price codes: A06 in paper copy, A01 in microfiche. Final Report to New England River Basin Commission, Boston, Mass., November 1975. 112 p, 9 ref, 3 append. NERBC 2. IG.

Descriptors: *River basins, *Flood protection, *Connecticut River, *Social impact, Management, Flood control, Floods, Assessments, Flood plain insurance, Floodwater, Social aspects, Connecticut.
Identifiers: *National Flood Insurance Program, *Connecticut River Basin, Flood management methods, Management alternatives, Social performance criteria, Basic utilities, Flood plain management.

The effect of alternative flood management methods on different people over a period of time was examined. The analysis was intended to provide a framework for evaluating management alternatives in the light of a comprehensive value system--one that views social impacts parallel with environmental and economic impacts. The analysis suggested how alternatives could be modified to reduce adverse impacts and enhance favorable ones. A novel approach was developed which went beyond dollar measures to basic utilities such as safety/stability, well-being of spirit/mind, intimacy, social belonging/participation, and material well-being. A taxonomy of nine such utilities was set in an explorative 'e-model' of consumer behavior addressed to optimizing total well-being. All benefits and costs were put on a hypothetical comparative basis. Checklists were presented for the impacts of the National Flood Insurance Program, of relocation of structures in flood plains and flood basins, of flood warning and flood-episode management systems, and of proposed nonstructural flood plain management alternatives. The checklists provided a framework to aid in assembling and applying detailed empirical in-

formation the evaluation and improvement of flood plain management plans for specified areas. (Roberts-ISWS)
W77-03774

THE NATIONAL FLOOD INSURANCE PROGRAM: EXPLANATION AND LEGAL IMPLICATIONS,
Federal Highway Administration, Washington, D.C. Office of General Counsel.
G. M. Tierney.
Urban Lawyer, Vol. 8, No. 2, p. 279-306, 1976. 86 ref.

Descriptors: *Flood plain insurance, *Flood plain zoning, *Legal aspects, *Legislation, Water law, Legal review, Riparian land, Flood control, Land use, Watershed management, Non-structural alternatives, Insurance, Institutional constraints, Local governments.
Identifiers: *National Flood Insurance Program.

Under an early version of the Flood Insurance Program, certain landowners could be liable for the imposition of legal sanctions even though they did all within their power to comply with the law, according to legal research aimed at identifying strengths and weaknesses of the program and legal questions raised by implementation of the program on the federal and local levels. Under the law, individuals who desired flood insurance but who were prevented from meeting land use standards by the unwillingness or inability of their local government officials to enter the program, have been nevertheless liable. An amendment to eliminate the sanctions, however, would thwart the purpose of the Flood Insurance Program to encourage adequate land use measures to protect flood prone areas. Also, permanent federal subsidies would be needed to compensate landowners against high actuarial rates they would be charged by insurance companies when no land use restrictions would be enforced. And without sanctions, local government officials would have no incentive to enter the program. A better amendment would be for Congress to assume direct federal control of land use in flood prone areas, with validity for the act under the Commerce Clause of the United States Constitution. (Harris-Wisconsin)
W77-03956

6G. Ecologic Impact Of Water Development

ENVIRONMENTAL PROTECTION IN MEXICO AND CANADA,
Florida Univ., Gainesville. School of Law.
For primary bibliographic entry see Field 6E.
W77-03698

THE COSTS AND EFFECTS OF CHRONIC EXPOSURE TO LOW-LEVEL POLLUTANTS IN THE ENVIRONMENT,
Hearings--Sub Comm on the Environment and the Atmosphere, Comm on Science and Technology, US House of Representatives, November 7, 10, 11, 12, 13, 14, and 17, 1975 p 1-1457. 1457 p.

Descriptors: *Water pollution effects, *Testing procedures, *Federal government, *Air pollution effects, *Path of pollutants, Climatology, Epidemiology, Thermal pollution, Environmental effects, Testing, Data collections, Agriculture, Pollutant identification, Toxins, Pollutants, Economic impact.
Identifiers: *Congressional hearings.

Congressional hearings were held to receive testimony on causes, effects and costs of low-level environmental pollution. Information submitted centered on effects on human health, agriculture, ecology, and climate. Difficulties in assessment noted included environmental complexity, interactions between pollutants, and applicability of testing and statistical results. Lack of information on baseline amounts of substances in the environment along with a scarcity of economic results of pollution and realistic standards for pollution sources have made conclusions difficult to reach. All witnesses agreed that additional funding is necessary for research, and that there is negligible data on the health effects of most pollutants. It will be necessary to reduce testing costs per substance and to decrease the time necessary for completion of such studies. More emphasis on epidemiological research and data was urged, and new techniques for this was discussed. Witnesses also agreed on the need for an examination of the administrative structure of regulatory agencies. For effects on agriculture, withnesses dwelt on the inability to measure and predict losses accurately. Climatic concerns centered on the effects of carbon dioxide, particle loading, thermal pollution, and the altered chemical nature of precipitation. Again the limited knowledge of consequences was noted. (Molloy-Florida)
W77-03701

FRYINGPAN--ARKANSAS PROJECT COLORADO, FINAL ENVIRONMENTAL STATEMENT,
Bureau of Reclamation, Washington, D. C
For primary bibliographic entry see Field 8A.
W77-03702

THE PROJECTED ECONOMIC IMPACT OF THE RICHARD B. RUSSELL DAM AND LAKE UPON SOUTH CAROLINA,
Clemson Univ., S. C. Dept. of Agricultural Economics and Rural Sociology.
For primary bibliographic entry see Field 6B.
W77-03735

ELEMENTS OF QUALITY ASSURANCE IN ENVIRONMENTAL SURVEILLANCE,
Los Alamos Scientific Lab., N. Mex. Environmental Studies Group.
For primary bibliographic entry see Field 7A.
W77-03786

TESTS OF COAST GUARD DEVELOPED HIGH SEAS OIL RECOVERY SYSTEMS AT EPA OHMSETT,
Coast Guard, Washington, D.C.
For primary bibliographic entry see Field 5G.
W77-03905

PHOTOGRAMMETRIC EXPERIMENTS ON NEARSHORE MIXING AND DIFFUSION,
Coastal Engineering Research Center, Fort Belvoir, Va.
For primary bibliographic entry see Field 2L.
W77-03907

DEVELOPMENT OF AN OIL-WATER POLLUTION MONITORING SYSTEM,
Naval Postgraduate School, Monterey, Calif.
For primary bibliographic entry see Field 5A.
W77-03908

MARSH GAS FROM THE ATLANTIC COASTAL PLAIN,
Delaware Univ., Newark. Coll. of Marine Studies.
For primary bibliographic entry see Field 2L.
W77-03913

EFFECTS OF WASTE WATER ON ESTUARINE ECOSYSTEMS,
Maryland Univ., Solomons. Chesapeake Biological Lab.
For primary bibliographic entry see Field 5C.
W77-03914

CONSTRUCTION IN THE COASTAL ZONE: POTENTIAL USE OF WASTE MATERIALS,
Coastal Engineering Research Center, F
Belvoir, Va.
S. J. Williams, and D. B. Duane.
Available from the National Technical Inform tion Service, Springfield, VA 22161 as AD/A-0 388, Price codes: A02 in paper copy, A01 microfiche. Reprint No. CERC-Reprint-2- Reprint from: Marine Geology, Vol 18, p 1- 1975. 16 p, 8 fig, 20 ref.

Descriptors: *Waste disposal, *Construct materials, *Waste dumps, *Waste stora *Resources development, Water resourc *Baseline studies, *Environmental effects.
Identifiers: Coastal zone, *New York Bi Ocean dumping, Site selection, Waste mater utilization, Man-made islands.

The Inner New York Bight, at the head of Hudson shelf channel, has been the site for oc disposal of various waste products since at l 1888. Natural channel-like bathymetry expres in 1845 is today a series of hills rising to within m (40 ft.) of the water surface superimposed u a broad lobate mound. This topographic inver created over the past nine decades is attribut to disposal of materials (soils, sand, and stone varying composition generated during const tion in the New York metropolitan area. Isop maps, sea-floor profiles, seismic records, vibratory cores show much of the fill has rema in place. Man-made islands proposed for the i continental shelf for siting power, port, or rec tional facilities will use large volumes of st material for core fill, which could be waste ma als such as those described. Effective regi coastal zone planning should recognize uses past and future waste materials as such pract would conserve sand and gravel resources other high-volume needs (shoreline nourishm and protection and construction aggregate) an leviate some of the site-selection problems in disposal of waste. (Sinha-OEIS)
W77-03916

AN ENVIRONMENTAL SURVEY OF EFFE OF DREDGING AND SPOIL DISPOSAL, N LONDON, CONNECTICUT. 1ST QUARTE REPORT.
National Marine Fisheries Service, Highla N.J. Middle Atlantic Coastal Fisheries Center.
For primary bibliographic entry see Field 5C.
W77-03917

AN ENVIRONMENTAL SURVEY OF EFFE OF DREDGING AND SPOIL DISPOSAL, N LONDON, CONNECTICUT. 2ND QUARTE REPORT.
National Marine Fisheries Service, Highla N.J. Middle Atlantic Coastal Fisheries Center.
For primary bibliographic entry see Field 5C.
W77-03918

AN ENVIRONMENTAL SURVEY OF EFFE OF DREDGING AND SPOIL DISPOSAL, N LONDON, CONNECTICUT. 3RD QUARTE REPORT.
National Marine Fisheries Service, Highla N.J. Middle Atlantic Coastal Fisheries Center.
For primary bibliographic entry see Field 5C.
W77-03919

APPLICATIONS OF ERTS IMAGERY SHIPBOARD OBSERVATIONS TO COAS ENVIRONMENTS STUDIES. PART I - HY SALINE ENVIRONMENTS, PART I COASTAL CIRCULATION ANALYSIS,
University of Southern California, Los An Dept. of Geological Sciences.
For primary bibliographic entry see Field 2L.
W77-03921

ELING AND INFORMATION HANDLING
NVIRONMENTAL SCIENCE,
ican Univ., Washington, D. C. Coll. of Public
rs.
rimary bibliographic entry see Field 5G.
03926

ITUTIONS AND OBJECTIVES ON THE
ER, ENERGY, ENVIRONMENT INTER-
,
ard Univ., Cambridge, Mass.
rimary bibliographic entry see Field 6B.
03934

SI-PUBLIC GOODS: PRICING THE COM-
S,
State Univ., Columbus.
rimary bibliographic entry see Field 6A.
03936

TE ON EFFLUENT CHARGES AND MAR-
STRUCTURE,
Univ. of New York at Binghamton.
omic Growth Inst.
rimary bibliographic entry see Field 5G.
03955

LUTION, WELFARE, AND ENVIRONMEN-
POLICY IN THE THEORY OF COMPARA-
ADVANTAGE,
western Univ., Evanston, Ill. Center for
matical Studies in Economics and Manage-
Science.
hig.
al of Environmental Economics and
gement, Vol 2, No 3, p 160-169, 1976. 16 ref.

iptors: *Economic impact, *Foreign coun-
*Foreign trade, *Environmental control,
retical analysis, *Mathematical models,
nomics, Comparative benefits, Comparative
Equilibrium prices, Model studies, Export,
d Nations, Governments, Political aspects,
re(Economics).
fiers: *Theorem of Comparative Advantage.

ple two-sector general equilibrium economic
is used to demonstrate that certain well-
n propositions of neoclassical trade theory
e applied to nations with pollution-generating
ries. Results from use of the model are ob-
not only under the assumption that the
ries do not enforce any environmental pol-
ut also under the assumption that one or each
y implements an environmental price and
ard system. In particular, several versions of
heorem of Comparative Advantage (TCA)
respect to environmental scarcity are
d, along with a theorem on welfare loses
trade and an emission charge equalization
m. The theoretical work attempts to fill a
existing research, wherein there has not
explicit rationalization and qualification with
ral equilibrium model of the proposition that
applies to trading economies with polluting
ries, and that consequently, countries with
ely large environmental assimilative capaci-
hould specialize in and export those com-
ies which are relatively pollution-intensive in
roduction. (Harris-Wisconsin)
3958

UENT CHARGES AND LICENSES UNDER
RTAINTY,
rd Univ., Cambridge, Mass. Dept. of
mics.
imary bibliographic entry see Field 5G.
3959

EXAMINATION OF ENVIRONMENTAL POLICIES USING PRODUCTION AND POLLUTION MICROPARAMETER DISTRIBUTIONS,
Tel-Aviv Univ. (Israel). Foerder Inst. for Economic Research.
E. Hochman, and D. Zilberman.
Working Paper No. 104, November 1975. 57 p. 16 fig., 4 tab., 4 ref., 1 append.

Descriptors: *Model studies, *Pollution abatement, *Pollution taxes(Charges), *Standards, Economic efficiency, Labor, Optimization, Mathematical models, Planning, Regulation, Governments, Industries, Industrial production.

A method to predict and compare the short-run aggregate output, pollution and labor input of a competitive industry facing various environmental policies is suggested. The basic model begins with a polluting industry that does not have the option of pollution abatement. Assuming that the labor output and pollution output ratios vary among the microunits of the industry, the aggregates are derived for systems supported by taxes and regulated by standards. Next the optimal properties of the two policy tools were compared. The results were demonstrated assuming Pareto distribution of the microparameters. This basic model was extended to include pollution abatement technologies, and then the problem was examined from the perspective of the Salter model. Results indicate that the tax supported pollution abatement system is more efficient, while the system supported by standards yields higher levels of output for a given threshold level of pollution. However, the system supported by standards also results in a decrease in the productivity of the industry, since by ignoring efficiency considerations, productive plants which are highly polluting are shut down while some inefficient plants are reopened. (Luedtke-Wisconsin)
W77-03961

GEOTHERMAL TECHNOECOSYSTEMS AND WATER CYCLES IN ARID LANDS,
Arizona Univ., Tucson. Office of Arid Lands Studies.
C. Duffield.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 091, Price codes: A10 in paper copy, A01 in microfiche. Arid Lands Resource Information Paper No 8, November, 1976. 202 p, 8 fig, 7 tab, 400 ref. OWRT W-197(5254)(1).

Descriptors: *Geothermal studies, *Arid lands, *Bibliographies, *Geology, *Technology, *Reviews, Engineering structures, Multiple purpose projects, Ecosystems, Industries, Exploration, Exploitation, Resources development, Comprehensive planning, Desalination, Electric power production, Environmental effects, Research and development, Water resources development, Thermodynamics, Energy conversion, Convection, Economics, Ecology, Limiting factors, Adaptation, Evolution, Succession, Niches, Competition, Distribution patterns, Heat transfer.
Identifiers: *Technoecology, *Imperial Valley, Technoecosystems, Technoorganisms, Salton trough, Developing countries.

Large, complex industrial systems are closely analogous to biological ecosystems and can be called 'technoecosystems'. This analogy has many profound implications for design, management, and comprehension of industrial civilizations and their components. Rapidly evolving technology for exploitation of geothermal resources (heat, fluids, and chemicals) is reviewed within the framework of technoecology. Water is vital to geothermal technoecosystems as heat storage and transfer medium, as coolant for thermodynamic cycles of power production and distillation, and as chemical reactant and solvent. In arid lands, fresh water can be an especially valuable output for agricultural, industrial, and municipal use; geothermal technoecosystems are carefully adapted to water availability and needs. Systems planned or established in arid developing regions and Imperial Valley, California, are presented as detailed case studies. Where resource conditions are favorable, geothermal technoecosystems can produce large amounts of power, water, space and process heat, and industrial chemicals in a short time. However, geothermal reserves are finite and nonrenewable at projected exploitation rates. For billions of years geothermal heat has driven dynamic geological ordering processes through a cascaded hierarchy of convection systems. Geothermal technoecosystems outcompete geological systems in heat extraction. Hence ever-deeper geothermal resource exploitation threatens geological systems of ever-larger scale with irreversible modification and possible extinction. Annotated bibliography is included.
W77-03966

RUNOFF REGULATION FOR HYDRO-POWER AND ITS EFFECT ON THE OCEAN ENVIRONMENT,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia).
For primary bibliographic entry see Field 2E.
W77-03974

FORECASTINGS A LINE OF INVESTIGATIONS OF MEMBER COUNTRIES OF THE COUNCIL OF MUTUAL ECONOMIC ASSISTANCE IN THE AREA OF ENVIRONMENTAL HYGIENE, (IN RUSSIAN),
Institute of General and Municipal Hygiene, Moscow (USSR).
For primary bibliographic entry see Field 5G.
W77-04016

PREFERENCE MODELS OF ENVIRONMENTAL IMPACT,
R. L. Keeney.
Research Memorandum, RM-76-4, International Institute for Applied Systems Analysis, Laxenburg, Austria, January 1976. 21 p, 1 fig, 1 tab, 25 ref.

Descriptors: *Environmental control, *Water quality, *Preferences(Water rights), *Decision making, Evaluation, Fisheries, Forests, Pest control, Nuclear powerplants, Model studies, Systems analysis.
Identifiers: *Multiple objectives, *Preference models, *Environmental impact, *Multiattribute utility theory, Uncertainty, Impact model, Hazardous materials transport.

Environmental problems usually involve multiple conflicting objectives, large uncertainties concerning the possible environmental impact, and several individuals or groups whose preferences are very different, but yet very important in choosing an alternative. If one wishes to influence the decision-making process using analysis, the above issues should be addressed. One critical aspect, which is usually conducted informally, involves weighing the advantages and disadvantages of the possible impacts of the various alternatives by each of the interested parties. A multiattribute utility model, called a utility function, quantifies the preferences of an interested party in a manner convenient for integration with an impact model, so that formal evaluation of the alternatives is logical and straightforward. Using the utility function of the various interested individuals and groups, it is possible to examine the different preference structures and their implications to illuminate the conflicts, focus the discussion, generate creative alternatives, and promote constructive compromises. Herein, the basic ideas of multiattribute utility are presented and placed in the context of a decision-making framework. The manner in which it aids the analysis of environmental issues is discussed. Several problems having environmental components in which multiattribute utility was used are surveyed. These include siting nuclear

power facilities, developing fisheries, controlling a forest pest, examining energy policy, and transporting hazardous materials. (Bell-Cornell)
W77-04020

7. RESOURCES DATA

7A. Network Design

ELEMENTS OF QUALITY ASSURANCE IN ENVIRONMENTAL SURVEILLANCE,
Los Alamos Scientific Lab., N. Mex. Environmental Studies Group.
L. J. Johnson.
Available from the National Technical Information Service, Springfield, VA 22161 as CONF-750 967-17, Price codes: A02 in paper copy, A01 in microfiche. LA-UR-75-1915, 1975. 11 p. 2 ref. (Submitted to the proceedings of the 3rd Environmental Protection Conference, September 23-25, 1975, Chicago, Ill.). ERDA W-7405-eng-36.

Descriptors: *Monitoring, *Surveys, *Standards, *Reliability, *Variability, *Network design, Data collections, Sampling, Analytical techniques, Environmental control, Methodology.

Those elements of uncertainty associated with environmental monitoring important to accuracy, reproducibility, sensitivity, acceptability and cost effectiveness, along with the controls applicable to sample collection, handling, chemical analysis, measurement and data presentation, are discussed. Some of the sources of unrecognized uncertainty in making environmental measurements are identified with the intent that they can lead to a more quantitative understanding of specific uncertainties through an attempt to measure and report them with 'quality assurance' (defined as the creation of confidence in, or the allaying of doubts about the character of the environmemtal information in question). A broad are to which quality assurance information can contribute is that of making environmental data sets comparable between laboratories in order that general meaning may be drawn from the accumulated information. Several generalized elements of quality assurance required in surveillance programs are listed as well as the operational steps. The sources of uncertainty which have been identified in environmental monitoring and which contribute to the variability of the results are discussed as related to air, water and soil. Recommendations for developing and reporting environmental surveillance data are provided. (Auen-Wisconsin)
W77-03786

7B. Data Acquisition

ESTIMATING RELATIVE LEAF WATER CONTENT WITH A SIMPLE BETA GAUGE CALIBRATION,
Soil Conservation Service, Klamath Falls, Oreg.
R. P. Obrigewitsch, D. E. Rolston, D. R. Nielsen, and F. S. Nakayama.
Agronomy Journal, Vol. 67, No. 5, p 729-732, September-October 1975. 3 fig, 8 ref.

Descriptors: *Sugar beets, *Crop response, Moisture, Plant growth, Plant tissues, Calibration, Estimating, Measurement, Radiation.
Identifiers: Beta radiation, *Leaf water content.

Existing methods for periodically measuring plant water status require considerable instrumentation or time. A method is described that simplifies plant water measurement by providing a completely linear calibration between attenuated beta radiation through a plant leaf and its relative water content simply by measuring the radiation intensity through the leaf at only two water contents - full turgidity and complete dryness. (Skogerboe-Colo St)
W77-03635

THE TWO-AXIS METHOD: A NEW METHOD TO CALCULATE AVERAGE PRECIPITATION OVER A BASIN,
Forest Service (USDA), Ogden, Utah. Intermountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 2B.
W77-03755

ESTIMATE OF THE SUITABILITY OF TELEVISION INFORMATION FROM METEOROLOGICAL METEOR SATELLITES FOR DETERMINING ICE CONDITIONS IN LAKES AND RESERVOIRS,
For primary bibliographic entry see Field 2C.
W77-03765

ANALYSIS OF SIX BROADBAND OPTICAL FILTERS FOR MEASURING CHLOROPHYLL-A AND SUSPENDED SOLIDS IN THE PATUXENT RIVER,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 5A.
W77-03785

SOME PROBLEMS IN THE STUDY OF THE INUNDATION OF RIVER FLOOD PLAINS BY AEROSPACE METHODS,
For primary bibliographic entry see Field 4A.
W77-03847

HYDROLOGIC ASPECTS OF SPACE INVESTIGATIONS OF THE EARTH'S SURFACE (LITERATURE SURVEY),
V. V. Kupriyanov, and V. G. Prokacheva.
Soviet Hydrology, Selected Papers, No 1, p 13-27, 1975. 1 fig, 5 tab, 51 ref. Translated from Trudy Gossudarstvennogo Gidrologicheskogo Instituta, No 205, p 83-114, 1975.

Descriptors: *Remote sensing, *Hydrologic aspects, *Satellites(Artificial), *Reviews, Photography, Radar, Hydrology, Snow cover, Ice cover, Rivers, Publications, Lakes, Reservoirs, Watersheds(Basins), Soil moisture, Clouds, Cloud cover.
Identifiers: *Literature surveys.

In addition to ground based and aircraft (aero) methods, science is also provided now with remote space research methods that are being used increasingly in earth sciences. The rapid development of remote equipment and space carriers and the successful use of survey materials has led to the development of space techniques in earth sciences. Hydrology is one of the leading earth sciences, and, therefore, the interests of hydrology are also considered in all estimates of the possible uses of space surveys in environmental research. In economic computations of an operative satellite system for the study of natural resources in the United States, 20% (208 million dollars) of the total sum allocated to the needs of meteorology, oceanography, geology, geography, forestry, and agriculture (project) was assigned to hydrology. At the beginning, the foregoing possibilities were rather vague, but, at the present time, the major applications of space information in various earth science disciplines are fairly well defined. There is a relatively large number of articles on the applications of satellite information to purely hydrologic purposes. These articles are scattered in different journals and conference and symposium transactions and are lost in the general evaluation of the applicability of satellite surveys to environmental research. The purpose of this paper was to systematize the published data on the use of satellite information for hydrologic purposes. (Sims-ISWS)
W77-03848

USE OF SATELLITE SURVEY MATERIAL GLACIOLOGICAL INVESTIGATIONS,
Akademiya Nauk SSSR, Moscow. Inst Geografii.
For primary bibliographic entry see Field 2C.
W77-03851

ERTS-1, A NEW WINDOW ON OUR PLANET
Geological Survey, Reston, Va.
Available from the Supt. of Documents, G Washington, DC 20402, Price $13.00. Professi Paper 929, 1976. 362 p, 256 fig, 2 tab, 147 ref. Williams, Jr., W. D. Carter, Ed.

Descriptors: *Remote sensing, *Nat resources, *Satellites(Artificial), *Aerial pho raphy, *Infrared radiation, Surveys, Sedi transport, Path of pollutants, Land use, Envi mental effects, Vegetation, Topography, D mentation, Reviews, Federal government, *W resources, Monitoring, Pollutant identifica Lakes.
Identifiers: *ERTS-1.

The launch, on July 23, 1972, of the first E Resources Technology Satellite (ERTS-1) by National Aeronautics and Space Administra was a major step forward in extending man's ty to inventory the Earth's resources and to e ate objectively his impact upon the environm ERTS spacecraft represent the first step in m ing space and remote-sensing technologies i system for inventorying and managing the Ea resources. Examples presented in this demonstrate ERTS' vast potential for inven ing resources, monitoring environmental c tions, and measuring changes. Such informati essential for the full evaluation of the Fe lands and determining their future use, as w for improved planning of overall land throughout the United States and the world. bureaus of the U.S. Department of Interior roles in the ERTS project. Nearly all of these ticipating bureaus are represented in almos papers included in this book. Chapter 3 is en 'Applications to Water Resources' and contai separate sections. (Woodard-USGS)
W77-03875

APPLICATIONS OF ERTS IMAGERY SHIPBOARD OBSERVATIONS TO COAS ENVIRONMENTS STUDIES. PART I - HY SALINE ENVIRONMENTS, PART COASTAL CIRCULATION ANALYSIS,
University of Southern California, Los An Dept. of Geological Sciences.
For primary bibliographic entry see Field 2L.
W77-03921

OPERATIONAL APPLICATIONS OF SA LITE SNOWCOVER OBSERVATIONS LANDSAT DATA COLLECTION SYST OPERATIONS IN CENTRAL ARIZONA,
Geological Survey, Tucson, Ariz. Resources Div.
For primary bibliographic entry see Field 2C.
W77-03971

A METHOD FOR THE AUTOMATIC SUREMENT OF WAVE FREQUENCY,
Canada Centre for Inland Waters, Burli (Ontario).
For primary bibliographic entry see Field 2L.
W77-03981

7C. Evaluation, Processing and Publication

COMPUTER MODELING,
National Research Council of Canada, O (Ontario). Div. of Biological Sciences.
For primary bibliographic entry see Field 5B.
W77-03679

ER RESOURCES DATA SYSTEM,
ning Univ., Laramie. Water Resources
rch Inst.
Smith, V. C. Pelton, and S. A. Bender.
able from the National Technical Informa-
ervice, Springfield, VA 22161 as PB-262 969,
codes: A07 in paper copy, A01 in microfiche.
Resources Series No. 61, July 1976. 136 p,
52 tab, 8 ref.

iptors: *Wyoming, *Computer programs,
puter models, *Data collections, *Data
e and retrieval, Water quality, Climatology,
tic data, Surface waters, Snow.
fiers: *Data systems, Water resource data
ns.

Vater Resources Data System (WRDS) is a
uterized system for storage, retrieval, and
is of surface water, water quality, cli-
ogical, and snow course data. This report
bes the kinds of data stored, methods of
al, kinds of analyses, how users can obtain
nd user costs on the current system.
3728

APPLICATION OF HYMO TO STUDY
S OF SOUTHWESTERN WYOMING FOR
ACE RUNOFF AND SOIL LOSS ESTI-
ES,
ing Univ., Laramie. Water Resources
rch Inst.
imary bibliographic entry see Field 4A.
3729

TER RESOURCES DATA MANAGEMENT
EM FOR SOUTH CAROLINA,
on Univ., S. C. Dept. of Civil Engineering.
Law.
ble from the National Technical Informa-
ervice, Springfield, VA 22161 as PB-262 949,
odes: A07 in paper copy, A01 in microfiche.
Carolina Water Resources Research In-
, Clemson, Completion Report, September
39 p, 33 ref, 3 append. S-011-SC.

ptors: Analytical techniques, *Computer
s, *Computer programs, Data collections,
processing, *Data storage and retrieval,
nation retrieval.

a management system was developed to
e data with an areal retrieval system (based
ORET II) and a river mileage retrieval
(based on STORET I). Currently,
tation and climatologic data, streamflow
ean daily flows and annual flood flows) are
le with a provision for groundwater data
available. A discussion of sources of pro-
and subroutines available for use is
ted.
3733

ELIMINARY STUDY OF THE MAG-
E, FREQUENCY AND DISTRIBUTION
TENSE RAINFALL IN NIGERIA,
Univ. (Nigeria). Dept. of Geography.
mary bibliographic entry see Field 2B.
3756

ORATIVE COOLING OF A PARTIALLY-
ND TRANSPIRING LEAF-I. COMPUTER
L AND ITS EVALUATION USING WIND-
EL EXPERIMENTS,
Carolina State Univ., Raleigh. Dept. of
cal and Agricultural Engineering.
mary bibliographic entry see Field 2D.
3757

ORATIVE COOLING OF A PARTIALLY-
AND TRANSPIRING LEAF-II. SIMU-
EFFECT OF VARIATIONS IN EN-
MENTAL CONDITIONS, LEAF PRO-

PERTIES, AND SURFACE WATER CHARAC-
TERISTICS,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
For primary bibliographic entry see Field 2D.
W77-03758

LARGESCALE RIPPLES OF THE LOWER WABASH RIVER,
Northwestern Univ., Evanston, Ill. Dept. of Geological Sciences.
For primary bibliographic entry see Field 2J.
W77-03761

A RECONNAISSANCE OF THE RECENT SEDIMENTS OF THE RANNS OF KUTCH, INDIA,
Imperial Coll. of Science and Technology, London (England). Dept. of Geology.
For primary bibliographic entry see Field 2L.
W77-03762

THE EFFECTS OF AGRICULTURAL RUN-OFF AND SILTATION ON A NEW RECREATIONAL LAKE,
Illinois State Univ., Normal. Dept. of Biological Sciences; and Illinois State Univ., Normal. Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W77-03766

SIMULTANEOUS DETERMINATION OF TOTAL, NON-CARBONATE AND CARBONATE WATER HARDNESS BY DIRECT POTENTIOMETRY,
Canada Centre for Insland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5A.
W77-03780

A COMPENDIUM OF LAKE AND RESERVOIR DATA COLLECTED BY THE NATIONAL EUTROPHICATION SURVEY IN THE NORTHEAST AND NORTHCENTRAL UNITED STATES.
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5C.
W77-03784

HYBRID COMPUTER MODEL OF ST. VENANT EQUATIONS,
Department of Agriculture, Lethbridge (Alberta). Research Station.
For primary bibliographic entry see Field 2E.
W77-03832

PREOPERATIONAL AND OPERATIONAL HYDROTHERMAL FIELD DATA ACQUISITION AND ANALYSIS,
Karlsruhe Univ. (West Germany). Institut Fuer Hydromechanik.
For primary bibliographic entry see Field 5B.
W77-03837

AUGMENTATION OF 1968-1972 WINTER STORMS IN NEW MEXICO,
New Mexico State Univ., University Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 3B.
W77-03838

AN INVESTIGATION INTO THE EFFECTS OF FORESTRY PLANTATIONS ON THE WATER QUALITY OF UPLAND RESERVOIRS IN NORTHERN IRELAND,
Ministry of Agriculture, Crumlin (Northern Ireland). Freshwater Biological Investigation Unit.
For primary bibliographic entry see Field 5B.
W77-03840

SPECTRAL ANALYSIS OF THE LONG-TERM OCEANOGRAPHIC TIME SERIES AT OCEAN WEATHER STATION 'P',
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Atlantic Oceanographic Lab.
For primary bibliographic entry see Field 2L.
W77-03843

A STUDY IN THE SLOPE WATER REGION SOUTH OF HALIFAX,
Dalhousie Univ., Halifax (Nova Scotia). Dept. of Oceanography.
For primary bibliographic entry see Field 2L.
W77-03844

MEASUREMENTS OF WAVES IN SOUTHAMPTON WATER AND THEIR VARIATION WITH THE VELOCITY OF THE TIDAL CURRENT,
University of East Anglia, Norwich (England). School of Environmental Sciences.
For primary bibliographic entry see Field 2L.
W77-03856

CHEMICAL AND PHYSICAL DATA FOR THE FLAMING GORGE RESERVOIR AREA, UTAH AND WYOMING, 1973-75,
Geological Survey, Salt Lake City, Utah.
E. L. Bolke.
Utah Basic-Data Release No 27, 1976. 35 p, 1 fig, 3 tab, 11 ref.

Descriptors: *Water quality, *Chemial analysis, *Water analysis, *Reservoirs, *Basic data collections, Sampling, Sites, On-site data collections, Laboratory tests, Chemical properties, Water temperature, Physical properties, *Utah, *Wyoming, Pollutant identification.
Identifiers: *Flaming Gorge reservoir(Utha-Wyo).

Water-quality data for Flaming Gorge Reservoir (Utah and Wyoming) are presented for samples collected at 25 sites by the U.S. Geological Survey from August 1973 to October 1975. (Woodard-USGS)
W77-03881

WATER RESOURCES DATA FOR NEBRASKA, WATER YEAR 1975,
Geological Survey, Lincoln, Nebr.
Water-Data Report NE-75-1, July 1976. 469 p, 4 fig, 4 tab, 30 ref.

Descriptors: *Hydrologic data, *Surface waters, *Groundwater, *Water quality, *Nebraska, Streamflow, Flow rates, Gaging stations, Water levels, Observation wells, Lakes, Reservoirs, Chemical analysis, Sediments, Sampling, Sites.

Water resources data for the 1975 water year for Nebraska consists of records of stage, discharge, and water quality of streams; stage and contents of lakes and reservoirs; and water levels and water quality in wells and springs. Included are discharge records for 140 gaging stations; stage and contents for 9 lakes and reservoirs; water quality for 43 gaging stations, 22 ungaged stations, 29 partial-record flow stations, and 173 wells; and water levels for 66 observation wells. Also included are 115 crest-stage partial-record stations and 26 low-flow partial-record stations. Additional water data were collected at various sites, not part of the systematic data collection program, and are published as miscellaneous measurements. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Nebraska. (Woodard-USGS)
W77-03885

GROUND-WATER LEVELS IN WYOMING, 1975,
Geological Survey, Cheyenne, Wyo. Water Resources Div.
For primary bibliographic entry see Field 4B.

W77-03888

HYDROLOGIC UNIT MAP--1974, STATE OF COLORADO.
Geological Survey, Reston, Va.
Hydrologic Unit Map of Colorado, 1976. 1 sheet.

Descriptors: *Maps, *Hydrology, *Colorado, Water resources, Data collections, Planning, Hydrologic systems, Regions, Land resources.
Identifiers: *Hydrologic unit maps(Color), *Hydrologic boundaries, Subregions, Accounting units, Cataloging units.

This map and accompanying table show Hydrologic Units in Colorado that are basically hydrographic in nature. The Cataloging Units shown will supplant the Cataloging Units previously used by the U.S. Geological Survey in its Catalog of Information of Water Data (1966-72). The Regions, Subregions and Accounting Units are aggregates of the Cataloging Units. The Regions and Subregions are currently (1974) used by the U.S. Water Resources Council for comprehensive planning, including the National Assessment, and as a standard geographical framwork for more detailed water and related land-resources planning. The Accounting Units are those currently (1974) in use by the U.S. Geological Survey for managing the National Water Data Network. (Woodard-USGS)
W77-03893

WATER AVAILABILITY OF JEFFERSON COUNTY, ALABAMA,
Geological Survey, Tuscaloosa, Ala. Water Resources Div.
For primary bibliographic entry see Field 4A.
W77-03894

CHEMICAL HAZARDS RESPONSE INFORMATION SYSTEM FOR MULTIMODAL ACCIDENTS (CHRISMA) (A REEVALUATION OF CHRIS FOR ALL MODES OF TRANSPORTATION),
Little (Arthur D.), Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5A.
W77-03903

TWO METHODS FOR ADDING INFORMATION TO THE RESOURCES MANAGEMENT PROCESS,
Office of Water Research and Technology, Washington, D. C.
For primary bibliographic entry see Field 6B.
W77-03935

A SELECTED ANNOTATED BIBLIOGRAPHY ON THE ANALYSIS OF WATER RESOURCE SYSTEMS, SEVENTH VOLUME.
Office of Water Research and Technology, Washington, D. C.
For primary bibliographic entry see Field 6A.
W77-03967

LEAST COST CONTROL STRATEGIES IN URBAN DRAINAGE DESIGN -- A DYNAMIC PROGRAMMING APPROACH,
Washington Univ., Seattle. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W77-04007

APPLIED MATHEMATICAL MODELLING IN MARINE SCIENCE,
Liege Univ. (Belgium). Institut de Mathematique.
For primary bibliographic entry see Field 2L.
W77-04008

OPTIMAL SEQUENCING IN INSTALLING WASTEWATER TREATMENT PLANTS,
Consiglio Nazionale delle Ricerche, Milan (Italy). Centro di Teoria dei Sistemi.
For primary bibliographic entry see Field 5D.
W77-04019

DEMONSTRATION OF A STATE WATER QUALITY MANAGEMENT INFORMATION SYSTEM,
Pennsylvania Dept. of Environmental Resources, Harrisburg. Bureau of Water Quality Management.
For primary bibliographic entry see Field 5G.
W77-04021

8. ENGINEERING WORKS

8A. Structures

ESTIMATED WATER BALANCE FOR THE PROPOSED HADITHA RESERVOIR ON THE EUPHRATES RIVER IN IRAQ,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 4A.
W77-03625

FRYINGPAN--ARKANSAS PROJECT COLORADO, FINAL ENVIRONMENTAL STATEMENT,
Bureau of Reclamation, Washington, D. C
Dept. of the Interior Report INT FES 75-43, 2 volumes, April 16, 1975. 1060 p, 90 fig, 40 tab, 9 append.

Descriptors: *River basin development, *Environmental effects, *Dam construction, *Hydroelectric plants, *Multiple-purpose projects, *Colorado, Irrigation, Water yield improvement, Water qquality, Recreation, Flood control, Dams, Fish, Wildlife, Flooding, Colorado River Basin, Salinity, Tunnels, Reservoirs, Engineering structures, Federal government, Sedimentation.
Identifiers: *Arkansas River.

The Fryingpan--Arkansas Project is a multiple-purpose project on the Arkansas River in Colorado designed to supply irrigation water, develop hydroelectric power, supply and improve the quality of domestic and industrial water, develop recreational facilities, and provide flood control. The project will include 6 storage dams and reservoirs, 18 diversion dams and structures, 10 tunnels, and 2 power plants. The project begins in a mountainous area and ends in the plains. The major environmental impact of the project is the inundation of approximately 11,000 acres of land with consequent loss of wildlife habitat. Adverse environmental effects include an annual loss of 70,000 acre-feet of water to the Colorado River basin states resulting in an increased salinity in the Colorado River and a loss of power production capability at 5 hydroelectric plants on the Colorado River. Alternatives considered include cessation of further development and development of alternate sources of water and power. (Capehart-Florida)
W77-03702

SUPERCRITICAL FLOW OVER SILLS,
Govind Ballabh Pant Univ. of Agriculture and Technology, Pantnagar (India). Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W77-03747

8B. Hydraulics

HYDRAULICS OF SURFACE BUOYANT JET,
Technical Univ. of Denmark, Copenhagen. Inst. of Hydrodynamics and Hydraulic Engineering.
F. Engelund.
Journal of the Hydraulics Division, Americ
Society of Civil Engineers, Vol 102, No HY
Proceedings Paper 12409, p 1315-1325, Septemb
1976. 5 fig, 3 ref, 2 append.

Descriptors: *Jets, *Buoyancy, *Densi
*Entrainment, *Water pollution sources, Disp
sion, Mixing, Hydraulics, Discharge(Water), T
bulence, Equations, Mathematical studies, Path
pollutants, Waste disposal.
Identifiers: *Richardson number, Surface buoy
jet, Density distribution.

The spreading of a jet discharge horizontally at
surface of a quiescent receiving water of sligh
higher density was investigated, assuming that
bulk Richardson number is moderate. The deri
tion of the basic flow equation and conservation
mass were described briefly. Two different
proximations were obtained with the perturbat
theory. In the first-order approximation, the l
gitudinal inertia dominates, and similarity of
velocity profiles in different cross sections is
sumed. The second-order approximation was
mulated, and an exact solution of the equati
was presented. The second-order solution expla
observed features that are not described by
first-order approximation. The similarity
velocity profiles cannot, in general, be assu
except close to the outlet. (Singh-ISWS)
W77-03743

FLOW IN CORRUGATED PIPES,
Footscray Inst. of Tech., Victoria (Austra
Dept. of Civil Engineering.
R. J. Shipton, and H. R. Graze.
Journal of the Hydraulics Division, Amer
Society of Civil Engineers, Vol 102, No H
Proceedings Paper No 12414, p 1343-1351,
tember 1976. 5 fig, 2 tab, 7 ref, 3 append.

Descriptors: *Pipe flow, *Roughness(Hydrau
*Flow, *Laboratory tests, Pipes, Roughness c
ficient, Hydraulics, Head loss, Velocity, Tu
lent flow.
Identifiers: *Corrugated pipe.

The detailed measurement and analysis of the
bulent velocity distribution and friction loss
associated with the flow of water in a 100
diam corrugated plastic pipe were described.
the roughness geometry adopted, the friction
tor-Reynolds number characteristic reveals
distinct peak in the initial stages of transition
fully turbulent flow region followed by a ty
rising characteristic in the higher Reyn
number region. Velocity distributions were d
mined from pitot traverses. The resistance f
tion evaluated therefrom correlates with a
Reynolds number based on the true position o
logarithmic asymptote of the velocity profil
the fully rough zone of flow. (Humphreys-ISW
W77-03744

THEORETICAL MODEL OF RIVER ICE JA
Iowa Univ., Iowa City. Inst. of Hydr
Research.
For primary bibliographic entry see Field 2C.
W77-03745

FLOW AT GRADE-BREAK FROM MILD STEEP SLOPES,
Los Angeles Dept. of Water and Power, Calif.
R. G. Weyermuller, and M. G. Mostafa.
Journal of the Hydraulics Division, Ame
Society of Civil Engineers, Vol 102, No H
Proceedings Paper 12458, p 1439-1448, Oc
1976. 7 fig, 9 ref, 2 append.

Descriptors: *Backwater, *Flow pro
Gradually varied flow, Hydraulic models,
channel flow, Hydraulics, Flow measure
Critical flow, Flow, Equations.
Identifiers: Rectangular channel, Aerated a
Critical depth.

npirical equation was determined using ional analysis and experimental test data to ine the depth of flow at a grade-break in a gular channel where the slope changes from steep. The ratio of the depth of flow at the reak to the critical depth of flow was found pend largely upon the slope of the ream reach. The ratio reached a minimum 5 when the downstream slope was steep to produce clear separation of the flow aerated nappe. The upper limit of 1.0 was ched as the downstream slope approached . (Lee-ISWS)
3746

CRITICAL FLOW OVER SILLS,
Ballabh Pant Univ. of Agriculture and logy, Pantnagar (India). Dept. of Civil En-ng.
arki.
of the Hydraulics Division, American of Civil Engineers, Vol 102, No HY10, dings Paper 12480, p 1449-1459, October fig, 18 ref, 2 append.

tors: *Channels, *Open channel flow, critical flow, *Weirs, Drag, Jets, Laborato-s, Hydraulics, Hydraulic jump, Froude r.
ers: *Sills, Drag coefficiency, Wake.

mental investigations were carried out to he supercritical flow over a square section all flow situations except the jump condi-he supercritical flow was categorized into tinct types depending upon the ratio of the ght to upstream depth and the Froude r. This classification also corresponded to ashing and nonsplashing conditions. The ion, wake, and reattachment pressures nvestigated. The flow conditions were ex-at the point when the downstream face es and the bed pressures become negative. ost constant drag coefficient value, ob-from the present experiments, substan-he drag characteristics of bluff bodies in annels. (Lee-ISWS)
3747

FF FILES FOR FLOOD HYDROGRAPH ATION,
omp, Inc., Atlanta, Ga. Atlanta Regional

mary bibliographic entry see Field 2E.
3748

SSESSMENT OF TECHNIQUES FOR OTHERMAL PREDICTION,
husetts Inst. of Tech. Cambridge. Dept. of ngineering.
mary bibliographic entry see Field 5B.
3768

G OF SUBMERGED TWO-DIMEN-L BUOYANT JETS IN UNIFORM S OF WATER IN THE ABSENCE AND NCE OF WIND ACTION,
nia Univ., Berkeley. Div. of Hydraulic and y Engineering.
J.
le from the National Technical Informa-rvice, Springfield, VA 22161 as PB-263 094, de: A08 in paper copy, A01 in microfiche.
lic Engineering Laboratory, Report HEL ne, 1976. 141 p, 28 fig, 7 tab, 21 ref. nia Water Resources Center Project WRC-W-306).

tors: *Mathematical models, *Computer ns, *Jets, *Winds, Mixing, *Flow charac-, Water discharge, Waves(Water).
ers: *Submerged buoyant jets.

The mixing and flow behavior of submerged buoyant jets, discharged from sources with no initial net horizontal momentum flux into bodies of water of uniform density in the absence and presence of wind action, have been studied. A mathematical model, based on the initial fluxes of buoyancy and momentum, was developed to help describe the buoyant jet behavior in stagnant water of infinite depth. This model was confined to a slot source discharging vertically. A numerical solution of the model in terms of the characteristic source parameters was provided. The results were applied to the finite depth case when the free surface has no effect. (Snyder-California, Davis)
W77-03828

GIUSEPPE VENTUROLI, PIONEER IN CHANNEL STUDIES,
Karlsruhe Univ. (West Germany). Institut fuer Hydromechanik.
R. Chevray.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 102, No. HY10, Proceedings Paper 12488, p 1533-1540, October 1976. 5 fig, 17 ref, 2 append.

Descriptors: *Backwater, *Biographies, *Scientific personnel, *Channels, *History, Hydraulic jump, Hydraulics, *Pipe flow, Resistance, Flow.
Identifiers: *Giuseppe Venturoli, Channel studies, Hydraulic history, Flow establishment, Inertia, Differential equation, Rectangular channels.

The technical biography of Giuseppe Venturoli was presented with emphasis on the novel ideas he introduced and which contributed to the development of the science of hydraulics. Venturoli analyzed and performed experiments on flow through pipes and established the resistance formula in much the same form as it is known today. Moreover, it was he who first analyzed correctly the inertial aspect of flow establishment and presented for the first time the elementary backwater differential equation for rectangular channels. (Roberts-ISWS)
W77-03833

AIR-ENTRAINMENT IN HIGH HEAD GATE CONDUITS,
Uttar Pradesh Irrigation Research Inst., Roorkee (India).
For primary bibliographic entry see Field 8C.
W77-03835

STABILITY OF CHANNEL BEDS BY AMORING,
Agricultural Research Service, Oxford, Miss. Sedimentation Lab.
W. C. Little, and P. G. Mayer.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 102, No. HY11, Proceedings Paper 12519, p 1647-1661, November 1976. 4 fig, 3 tab, 12 ref, 3 append.

Descriptors: *Channel erosion, *Particle size, *Hydraulics, *Sediment distribution, *Sediment sorting, Flow characteristics, Shear drag, Laboratory tests, Model studies, Methodology, Hydraulic design, *Bank stability.
Identifiers: *Stable channel, *Armoring(Channels), Incipient motion.

At a certain flow velocity, coarse material accumulates on the channel bed surface. This accumulation is called armoring. This armored surface protects material just below the surface from being eroded out, thus forming a stable channel for that flow and lesser flows. The reported investigation was planned to determine quantitatively the effects of sediment gradation on channel armoring by conducting laboratory experiments with known original sediment distributions subjected to constant flow until sediment outflow ceased. Experimental results were used to develop empirical techniques to determine the following for a given logarithmic-normal sediment distribution and for given hydraulic flow conditions: (1) if the sediment bed would armor, and (2) in case it armors, the geometric mean diameter and standard deviation of the armored surface particles. The results can be used for designing stable channels in a given earth material by the proper choice of channel dimensions that affect hydraulic parameters. (Singh-ISWS)
W77-03836

INTRODUCTION TO GROUND-WATER HYDRAULICS--A PROGRAMED TEXT FOR SELF-INSTRUCTION,
Geological Survey, Reston, Va. Water Resources Div.
G. D. Bennett.
Available from Branch of Distribution, USGS, 1200 S. Eads St., Arlington, Va. 22202. Techniques of Water-Resources Investigations, Book 3, Chapter B2, 1976. 172 p, 52 ref.

Descriptors: *Groundwater movement, *Analytical techniques, *Darcys law, *Equations, *Groundwater resources, Hydrogeology, Water storage, Hydraulics, Aquifer characteristics, Training.
Identifiers: *Groundwater hydraulics, Self-instruction text.

The series of manuals on techniques describes procedures for planning and executing specialized work in water-resources investigations. The material is grouped under major subject headings called books and further subdivided into sections and chapters. This chapter is an introduction to the hydraulics of ground-water flow. With the exception of a few discussions in standard text format, the material is presented in programed form. Emphasis has been placed upon theory rather than application. Basic principles of ground-water hydraulics are outlined, their uses in developing equations of flow are demonstrated, representative formal solution are considered, and methods of approximate solution are described. At some points, regorous mathematical derivation is employed; elsewhere, the development relies upon physical reasoning and plausibility argument. (Woodard-USGS)
W77-03884

HYDROLOGIC EFFECTS OF HYPOTHETICAL EARTHQUAKE-CAUSED FLOODS BELOW JACKSON LAKE, NORTHWESTERN WYOMING,
Geological Survey, Cheyenne, Wyo. Water Resources Div.
For primary bibliographic entry see Field 8E.
W77-03895

RUNOFF REGULATION FOR HYDRO-POWER AND ITS EFFECT ON THE OCEAN ENVIRONMENT,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia).
For primary bibliographic entry see Field 2E.
W77-03974

COMPUTER MODELING OF ERODIBLE FLOOD CHANNELS AND DELTAS,
San Diego State Univ., Calif. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W77-03993

HYDRAULICS OF SLOPE EROSION BY OVERLAND FLOW,
Gifu Univ. (Japan). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W77-03994

MULTIVARIABLE FLOOD LEVEL FREQUENCY DISTRIBUTIONS,
Dillon (M. M.), Ltd., Toronto (Ontario).
D. L. Strelchuk.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 102, No HY12, Proceedings Paper 12637, p 1737-1744, December 1976. 4 fig, 4 ref, 2 append.

Descriptors: *Flood frequency, *Frequency analysis, *Frequency waves, Probability, Water level fluctuations, Water levels, Wave pile-up, Waves(Water), Dikes, Hydrology, Distribution patterns, Graphical analysis.
Identifiers: *Multivariate analysis, Conditional probability, Statistical analysis.

A graphical procedure was outlined for the determination of discrete values of a multivariable frequency distribution of three independent variables, each with individual frequency distributions. The method was developed for the determination of the frequency of water levels at a dike structure due to the combined occurrence of adjacent channel flows, outlet lake level fluctuations, and wave action. The frequency distribution was defined as a function of the triple integral of the product of the individual marginal frequency distributions. A graphical solution for the integration was detailed. The integrand was rearranged to products of two functions according to the statistical principle of mutually exclusivity and was solved using a rectangular coordinate system defined by the individual frequency distributions. This method may be used to find the frequency distribution of any multivariable function of two or more independent variables with known frequency distributions. (Lee-ISWS)
W77-03996

STOCHASTIC MODELS OF SEDIMENT MOTION ON FLAT BED,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W77-03997

8C. Hydraulic Machinery

AIl -ENTRAINMENT IN HIGH HEAD GATE CONDUITS,
Uttar Pradesh Irrigation Research Inst., Roorkee (India).
H. R. Sharma.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 102, No. HY11, Proceedings Paper 12523, p 1629-1646, November 1976. 12 fig, 1 tab, 18 ref, 2 append.

Descriptors: *Air entrainment, *Sluice gates, *Hydraulic jump, *Open channel flow, *Hydraulics, Pressure conduits, Froude number, Laboratory tests, Model studies, Velocity, Air demand.
Identifiers: *Air vent, Free flow, Vena contracta.

For successful operation of high head gated conduits and for avoiding structured damage due to cavitation and vibration, an adequate supply of air is necessary through an air vent located downstream of the gate. Only empirical formulas have so far been developed for estimating the ratio of the volumetric flow rate of air to that of water from the Froude number of the flow. The paper presented suitable relationships and diagrams, based on systematic experiments backed by theoretical considerations, for predicting air demand. Comparison of experimental and prototype data indicated that the prototype behavior can be predicted satisfactorily from model results for all types of flow provided other important parameters are also taken into account. Conduit roughness was found to have no significant effect on air entrainment. Measurements of air velocity by means of high speed cinematography indicated that the velocity at the interface is much higher than the mean velocity of water flow and that air velocity distribution is far removed from being logarithmic. (Singh-ISWS)
W77-03835

8E. Rock Mechanics and Geology

HYDROLOGIC EFFECTS OF HYPOTHETICAL EARTHQUAKE-CAUSED FLOODS BELOW JACKSON LAKE, NORTHWESTERN WYOMING,
Geological Survey, Cheyenne, Wyo. Water Resources Div.
W. R. Glass, T. N. Keefer, and J. G. Rankl.
Water-Resources Investigations 76-77 (open-file report), July 1976. 32 p, 18 fig, 1 plate, 1 tab, 15 ref.

Descriptors: *Dam failure, *Flood damage, *Earthquakes, *Simulation analysis, *Hydraulic models, Reservoirs, Flood profiles, Regression analysis, Computer models, *Wyoming.
Identifiers: *Jackson Lake(Wyo), Probable flood inundation, Accelerated discharge, Grand Teton National Park.

Jackson Lake, located in Grand Teton National Park, Wyoming, is in an area of seismic instability. There is a possibility of flooding in the Snake River downstream from Jackson Lake Dam in the event of a severe earthquake. Hypothetical floods were routed 38 miles (61 kilometers) downstream from the dam for three cases: (1) Instantaneous destruction of the dam outlet structure, (2) instantaneous destruction of the entire dam, and (3) for waves overtopping the dam without failure of the dam. In each case, a full reservoir was assumed. Hydrographs for outflow from the reservoir for the two cases of dam failure were developed utilizing an accelerated discharge due to the travel of a negative wave through the reservoir, and Muskingum storage routing. For the case of waves overtopping the dam, a 10-foot (3-meter) wave was assumed to be propagated from the upstream end of the reservori. A multiple-linearization technique was used to route the flow through the reach. The model was calibrated from U.S. Geological Survey streamflow records. Most extensive flooding and largest water velocities would occur if the entire dam were destroyed; floods for the other two cases were smaller. An inundation map was prepared from channel conveyance curves and profiles of the water surface. (Woodard-USGS)
W77-03895

CONSTRUCTION IN THE COASTAL ZONE: A POTENTIAL USE OF WASTE MATERIALS,
Coastal Engineering Research Center, Fort Belvoir, Va.
For primary bibliographic entry see Field 6G.
W77-03916

THE APPLICATION OF BOREHOLE GEOPHYSICS TO THE SELECTION AND MONITORING OF NUCLEAR WASTE DISPOSAL SITES,
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 5E.
W77-03970

8G. Materials

INTERNAL TREATMENTS FOR BOILERS OPERATING ABOVE 1200 PSI,
Nalco Chemical Co., Oak Brook, Ill.
P. B. Christiansen, and C. R. Hoefs.
TAPPI Engineering Conference, Houston, October 4-7, 1976, Preprinted Proceedings Book I, (TAPPI, Atlanta, Ga.), p 140-142. 4 ref, 1 tab.

Descriptors: *Boilers, *Corrosion cont
*Scaling, Water treatment, Industrial water, H
and paper industry, Chemical industry, Corros
Pressure.

The increasing use of high-pressure boilers (
psig and above) by industry has brought wi
new challenges in the control of internal bo
scale and corrosion. The prevention of corro
and scale deposits is discussed briefly, and
case histories are given illustrating how S
(Scale Control Agent developed by Nalco Ch
cal Company) reduced scaling in paper mill
petrochemical plant boilers. (Witt-IPC)
W77-03803

WATER TREATMENT FOR BOILER OPER
ING PRESSURES ABOVE 1200 PSIG,
Ecodyne Corp., Union, N. J. Graver Water Di
For primary bibliographic entry see Field 3E.
W77-03805

REDUCTION OF DEPOSIT FORMATION
HEAT EXCHANGERS (SNIZHENIE OS
KOOBRAZOVANIYA V TEPLOOBMENNOI
PARATURE),
L. N. Kraev, N. V. Glushchenko, K. G.
Shulakova, O. P. Opolchennyi, and V. A. Gruz
Gidroliznaya i Lesokhimicheskaya Promysl
nost, No. 6, p 26-27, 1976. 1 fig, 4 ref, 2 tab.

Descriptors: *Heat exchangers, *Corrosion
trol *Scaling, *Water treatment, Yeasts, Wa
Industrial wastes, Water pollution sources, S
Hydrogen ion concentration, Effluents, Ferm
tion, Equipment, Corrosion, Industrial water.
Identifiers: *Fermentation industry.

The possibility of using residual liquor from y
production, a waste of the fermentation indu
as a water additive to reduce scale formatio
heat exchange equipment was investigated. I
surements were made of the amount of
formed on steel plates immersed in water of
hardness and the same water containing 5
residual liquor, during boiling for 2 hr. Withou
additive, the amount of deposit formed on 1
cm plate surface was 28.7 mg; it was reduced t
3.4, 2.25, and 1.51 mg upon the addition of 5
15, and 20% residual liquor, respectively.
water pH of 6.5 (addition of 10-15% liquor),
was no corrosion of the carbon steel. These re
were fully confiremed in industrial tests in w
the residual liquor was added to hydr
process water. (Stapinski-IPC)
W77-03808

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ISMS, ANNOTATED BIBLIOGRAPHY OF
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W77-03640

HYDROLOGIC ASPECTS OF SPACE
VESTIGATIONS OF THE EARTH'S SURF
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For primary bibliographic entry see Field 7B.
W77-03848

ERTS-1, A NEW WINDOW ON OUR PLANE
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7B.
W77-03875

THERMAL TECHNOECOSYSTEMS AND
ER CYCLES IN ARID LANDS,
na Univ., Tucson. Office of Arid Lands Stu-

rimary bibliographic entry see Field 6G.
03966

LECTED ANNOTATED BIBLIOGRAPHY
THE ANALYSIS OF WATER RESOURCE
EMS, SEVENTH VOLUME.
e of Water Research and Technology,
ington, D. C.
rimary bibliographic entry see Field 6A.
03967

GATION EFFICIENCY, A BIBLIOG-
HY, VOLUME 2.
e of Water Research and Technology,
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rimary bibliographic entry see Field 03F.
03968

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-03821 5D

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-03824 5D

phorus Removal from Wastewater,
-03867 5D

ce for Purifying Sewage,
-03869 5D

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r Pollution Control Administration, A orandum Report on a Reconnaissance y.
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-03686 5D

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-03704 6E

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Consider the Alternatives (Best Practical ment Criterion).
-03690 5D

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-03700 5G

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AEOLIAN SOILS
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Aerated Ponds for Final Purification of Wood Chemical Plant Effluents (Aeriruemye prudy dlya doochistki stokob lesokhimicheskikh predpriyatii),
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AEROMONAS-PUNCTATA
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AGRICULTURAL RUNOFF
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- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

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- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.
- Municipal wastewater treatment technology at the Franklin Institute Research Laboratories.

Subject Fields

1 NATURE OF WATER

2 WATER CYCLE

3 WATER SUPPLY AUGMENTATION AND CONSERVATION

4 WATER QUANTITY MANAGEMENT AND CONTROL

5 WATER QUALITY MANAGEMENT AND PROTECTION

6 WATER RESOURCES PLANNING

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